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13. ABSTRACT

A computer model which simulates the traffic flow of a Navy port has been developed. The model causes a ship to be placed in one of seven possible states: on extended operations, in overhaul, at a tender, in port on normal operations, in port preparing for overseas movement, in port on 30-day stand down, or on short deployment on normal operations. Hotel utilities, which include steam and electric power, can be provided to a ship in port. A Monte Carlo method is used to determine the length of stay in any state. The model attempts to berth ships coming into port according to a pier-preference scheme. Input to the model includes a description of a ship and its cycle times, and a description of the pier in terms of its utilities and the ships it can berth. Computer output includes a summary of the time each ship spends in each state. The summary can be produced daily, quarterly, or for the entire simulation time of the run, which may be up to six years.

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Report 3967

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER
Bethesda, Maryland 20034

A PORT TRAFFIC SIMULATION MODEL

by

John Redding

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COMPUTATION AND MATHEMATICS DEPARTMENT

RESEARCH AND DEVELOPMENT REPORT

July 1972

Report 3967

A PORT TRAFFIC SIMULATION MODEL

The Naval Ship Research and Development Center is a U. S. Navy center for laboratory effort directed at achieving improved sea and air vehicles. It was formed in March 1967 by merging the David Taylor Model Basin at Carderock, Maryland with the Marine Engineering Laboratory at Annapolis, Maryland.

Naval Ship Research and Development Center

Bethesda, Md. 20034

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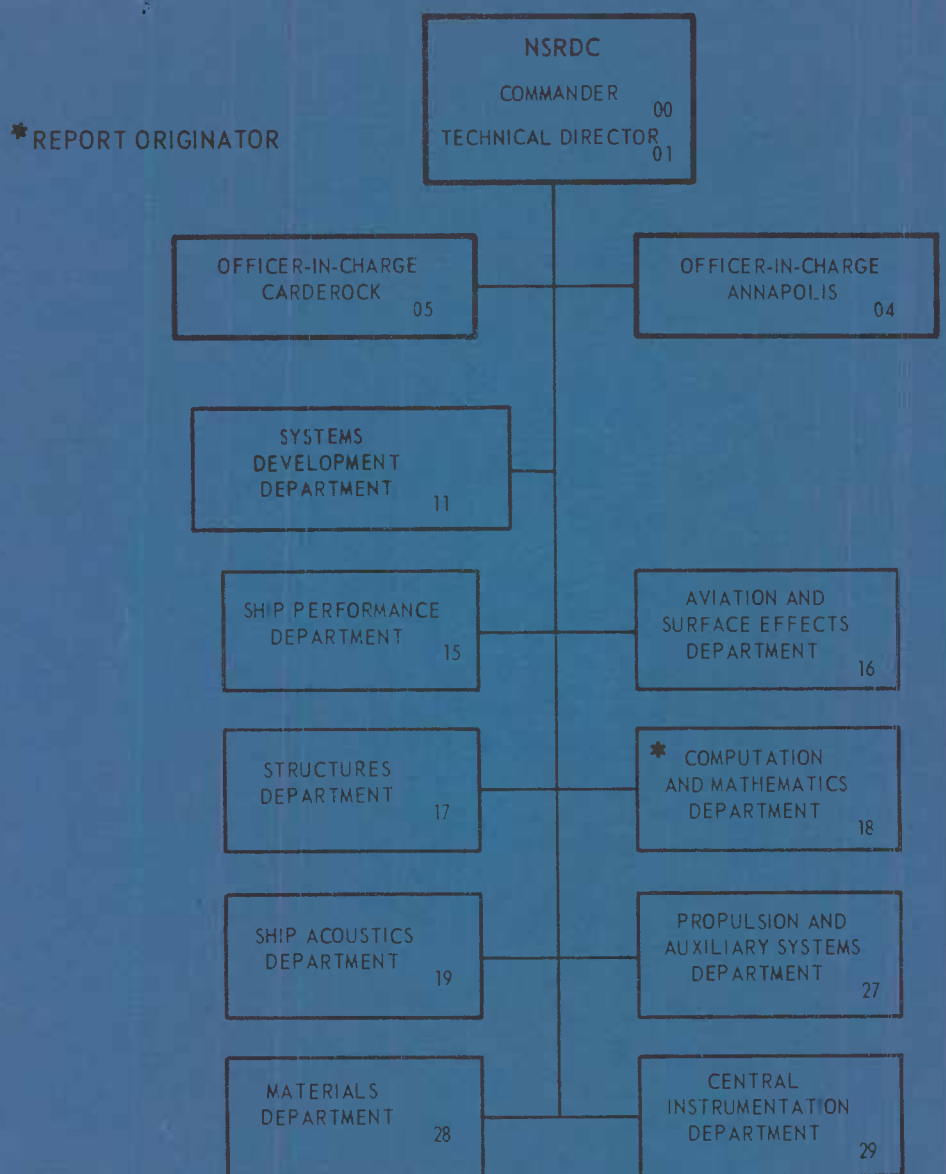

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DEPARTMENT OF THE NAVY

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER
Bethesda, Md. 20034

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ABSTRACT

A computer model which simulates the traffic flow of a Navy port has been developed. The model causes a ship to be placed in one of seven possible states: on extended operations, in overhaul, at a tender, in port on normal operations, in port preparing for overseas movement, in port on 30-day stand-down, or on short deployment on normal operations. Hotel utilities, which include steam and electric power, can be provided to a ship in port. A Monte Carlo method is used to determine the length of stay in any state. The model attempts to berth ships coming into port according to a pier-preference scheme. Input to the model includes a description of a ship and its cycle times, and a description of the pier in terms of its utilities and the ships it can berth. Computer output includes a summary of the time each ship spends in each state. The summary can be produced daily, quarterly, or for the entire simulation time of the run, which may be up to six years.

ADMINISTRATIVE INFORMATION

Model analysis and programming were performed by the Logistics Analysis Group of the Operations Research Division with programming assistance from the Program Analysis Group of the Computer-Aided Design Division. The work was funded by the Naval Facilities Engineering Command with O&MN funds.

1. INTRODUCTION

A Port Simulation Model was developed by the Systems Analysis Division (Code 201) of the Naval Facilities Engineering Command (NAVFAC) to help support the OPNAV 1968-69 Pier and Utility Study (Cold Iron Program). This model was later modified to accommodate the updated Cold Iron Study objectives.[1] In April 1971, the Systems Analysis Division requested that the Operations Research Division (Code 186) of the Naval Ship Research and Development Center (NAVSHIPRANDCEN) provide programming assistance for major modifications of this model.

After a thorough analysis of the model, members of the Operations Research Division working in conjunction with the Program Development Group (Code 1856, NAVSHIPRANDCEN), determined that the required modifications to the model were so extensive that a redesign of the model was required. This was accomplished and the computer simulation program was completed by December 1971. This report documents the revised simulation program.

Section 2 of the report presents a model description; Section 3 describes the model operation. Input and output are discussed in Sections 4 and 5 respectively. Section 6 provides recommendations for future development.

A program listing is provided in Appendix A; Appendix B presents the major arrays of the system. Sample input and output are shown in Appendixes C and D respectively.

---

1 "Update of the Cold Iron Program Study," Naval Facilities Engineering Command, Facilities Planning Group, Systems Analysis Division, NAVFAC Code 201, Study No. 108, 15 March 1971. (Study performed by Andrew J. Vero, LTJG Robert J. Kidder, Eloy R. Villa, Peter T. Bidwell, and Wendy A. Budd.)

2. MODEL DESCRIPTION

2.1 The System

The mathematical model is designed to simulate the flow of ship traffic in a port, given a description of the demands of each ship in the system on the port and the ability of the port to handle them. A summary of the traffic load, and how it affects each ship, is presented as computer output.

The model depicts seven states of Naval ship operation and is structured as a closed-system queuing process with limited facilities in some of the states. This generalized structure is used to analyze the effect of an increase or decrease in facilities on the operation of a port. A simulation model has been formulated so that the configuration of homeported ships for each port can be tested against a stated ship-deployment policy.

Each ship in the system must be in one of the following seven states: (1) on extended operations, (2) conducting normal operations in port, (3) conducting normal operations out of port, (4) in shipyard maintenance, (5) undergoing maintenance at a tender, (6) in priority cold iron, preparing for overseas movement (POM), (7) in priority cold iron returned from overseas extended operations (30-day stand-down). If a ship is waiting for berthing or utilities to become available for one of the last four states, then it is considered to be in state 2. Cold-iron status is defined as a condition in which the ship is provided with utility services from land sources so that it can shut down all boilers and utility generating equipment. The distribution of all ships among the seven states describes the condition of the port.

The system is represented in computer storage by a set of four major tables which contain information on each ship in the system. These tables are defined in Appendix B. They include (1) the ship's

state and the time remaining for the ship in that state, (2) the time remaining until the ship is permitted to enter either the POM or extended operation state, (3) the time remaining until the ship is permitted to enter the shipyard maintenance state, and (4) the time remaining until the ship is permitted to enter a tender maintenance state. A clock with a fixed time increment of one day is used to time the simulation. Each day the table is checked to determine which ships have completed the times remaining in their current states. Upon completion of its time in a state, a ship is moved through the system according to the diagrams in Figures 1 and 2. When a ship leaving one state may enter one of several other states, the state entered is determined according to a hierarchy, as explained in Section 3. The amount of time spent in a shipyard for overhaul, the time between overhauls, the time spent on extended operations, and the time periods of extended operation are obtained by selecting a sample via Monte Carlo methods from suitable normal distributions. The time remaining prior to tender maintenance at the beginning of each quarter is determined by a uniform distribution. These distributions are discussed in Section 3.1.

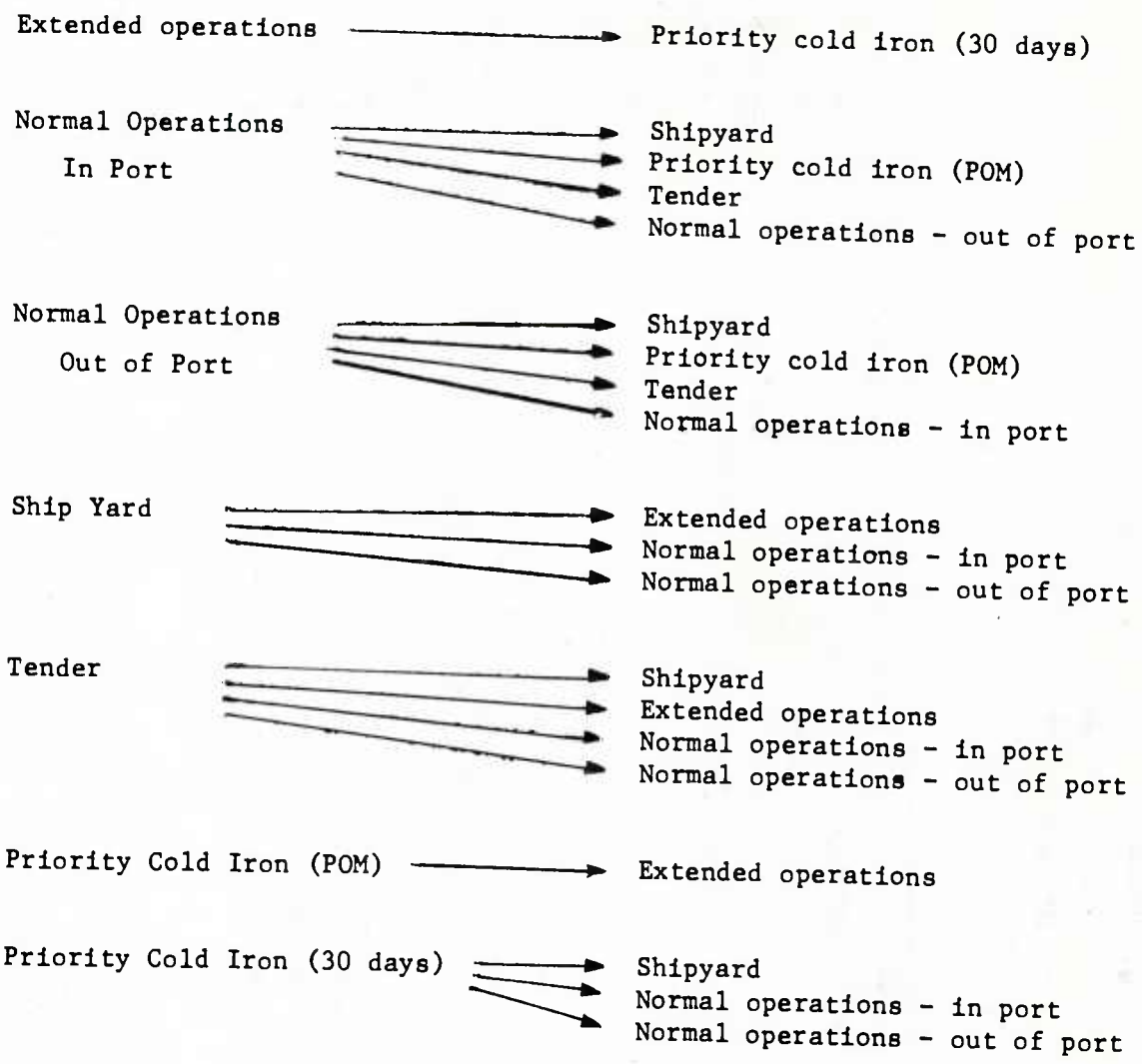

Figure 1 - Structure of the Queuing System

(Note: Regardless of the above flow pattern, the model considers a ship that is waiting for pier or utility accommodations to be in state 2, "normal operations in port.")

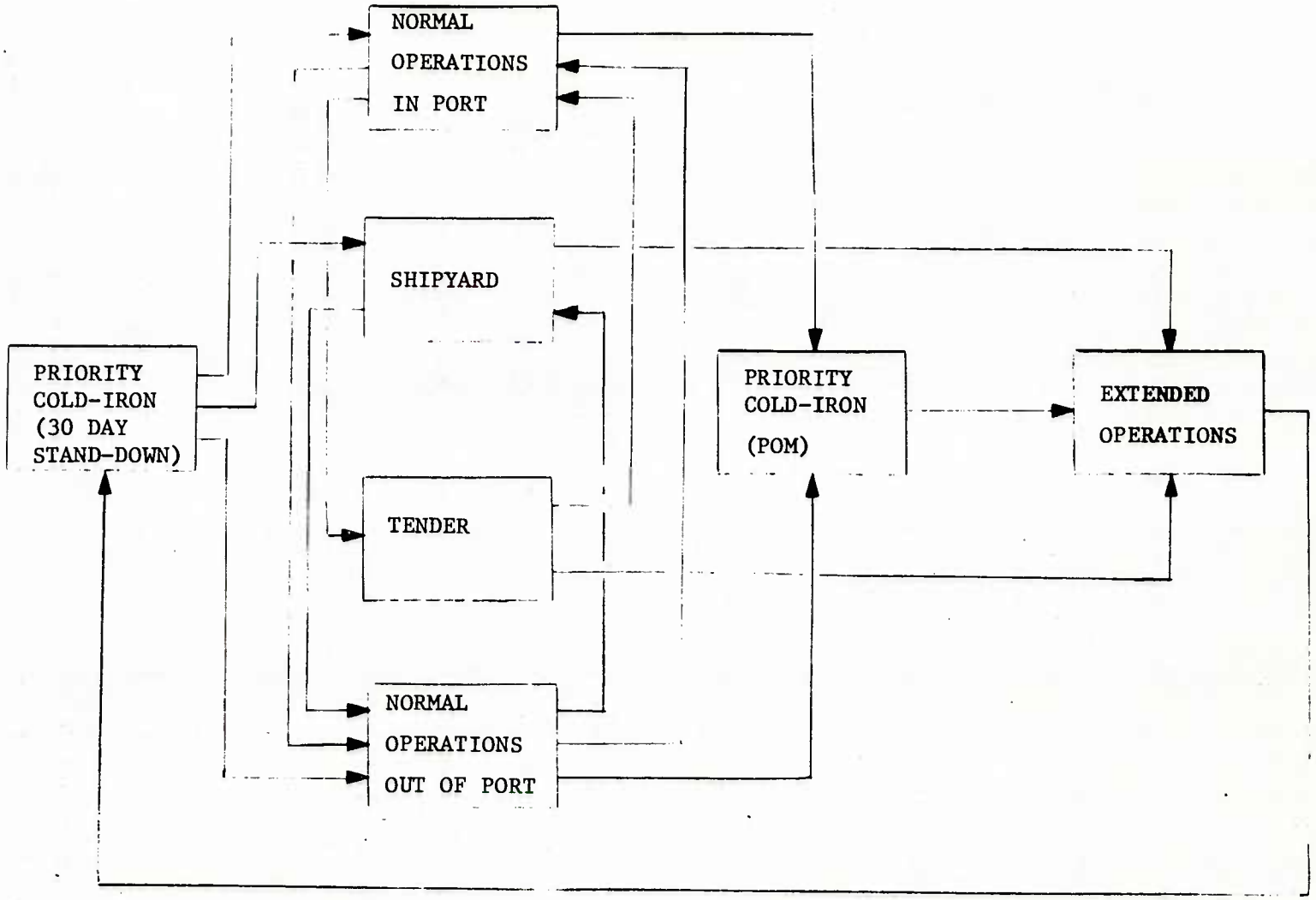

Figure 2 - Flow Diagram of the Queuing System

2.2 The Ships

Identification information and ship characteristics for each ship homeported in the port under study are stored in a table within the computer. The ship characteristics include:

- an index to indicate the ship type
- the amount of electric current and steam that the ship may furnish, if the ship is a tender
- the amount of electric current and steam that it requires for a cold-iron stand-down
- the number of frames* needed to berth it
- the number of ships that may nest next to it, if any
- the number of days per quarter that it may spend at a tender, if any (usually two or three weeks; i.e., 14 or 21 days)
- the mean and standard deviation in days for the time between overhauls
- the mean and standard deviation in days for the time in overhaul
- the mean and standard deviation in days for the time between extended operations
- the mean and standard deviation in days for time on extended operations.

A "class" designation for tenders is also included (see Section 3.2).

Ship types are indicated by the indexing scheme given in Table 1. This indexing scheme is used to indicate the types of ships that can occupy the same berthing positions.

---

* In discussing docks, a "frame" is 100 feet of berthing space alongside the dock.

TABLE 1 - SHIP INDEXES

INDEX	SHIP TYPE
1	CVAN, CVA
2	CVS
3	APSS
4	LPD
5	LPH
6	LSD
7	LST
8	AD
9	ADG
10	AE
11	AF
12	AFS
13	AGDE
14	AGMR
15	AGSS, AGS
16	AH
17	AKA
18	AN
19	AO, AOR
20	AOE
21	AOG
22	APA
23	AR
24	ARC, ARG
25	ARS
26	AS
27	ATF, ATA
28	AVM, AVB
29	CGN, CC, CAG, CG, CA, CLG
30	DXGN, DXG, DDG, DD, DDE
31	DLGN, DLG, DL
32	MCS
33	MSC
34	MSO
35	EPCER
36	DEG, DE
37	SS
38	SSBN
39	SSN
40	APD
41	ARL
42	ATS
43	AGC
44	IFS
45	AKS
46	ASR

2.3 Frame and Pier Description

Each pier in the port is described by a table in the computer memory containing the amount of electric power and steam available at that pier and the amount of electric power and steam in use at that pier.

The pier is described more specifically by a table containing information about each of its frames. This table includes:

- the status of the frame; i.e., occupied or empty
- the amount of electric power and steam available
- the number of ships that can nest against it
- the position of the frame in relation to the pier; i.e., at the beginning, at the end, or in between
- the pier number
- the ship types which can berth at the frame (a maximum of five separate ship indexes, ordered into five preferences as explained in Section 2.5)

If the frame is occupied, the following information is also included:

- the amount of electric power and steam in use
- the ship berthed pierside and the number of ships nested against it, if any

If less than five ship types can berth at a given frame, a frame preference index of 99 specifies that the frame will berth no other ships than those already specified, if any.

2.4 Berthing Protocol

Ships receive priority berthing if they are either preparing for overseas movement or returning from extended overseas operations. In the first case, they must receive a 21-day period in cold iron for preparatory maintenance; in the second, they must receive at least 30 days cold iron for ship maintenance and crew leave.

A ship can be berthed at pierside and provided with no utilities (steam and electric power), partial utilities, or full utilities (cold iron). Similarly it can be in one of these three conditions while nested to another ship, or it can be anchored in the stream while awaiting berthing.

In the model, as ships enter the port for berthing during the simulated day, they enter an arrival queue and are not berthed immediately. After all ships have been processed; i.e., all newly arrived ships are in the arrival queue, the model (1) attempts to provide utilities to those ships already in berths which still need them, (2) attempts to berth the ships still needing berthing, and (3) once a ship is berthed, attempts to provide utilities. Immediately eliminated from consideration for utilities are all ships which are expected to remain in port less than three days and all tenders supplying utilities. Initially considered are all ships occupying a berth and in a priority state; i.e., preparing for overseas movement or returned from extended operations. Following this, the rest of the berthed ships are considered.

After the berthed ships have been taken into account, ships in the stream and new arrivals are considered. First an attempt is made to berth priority ships waiting in the stream, then priority ships among the new arrivals, then the remaining ships waiting in the stream, and finally the remaining new arrivals.

Although ships preparing for overseas movement or returning from extended operations are given priority status for berthing and utilities, there is also an inherent priority among ships with the same defined priority (both have priority or neither has priority).

This results from the manner in which the information defining the ships is read-in and stored in the computer. If ships A and B both need utilities or can occupy the same berth, and if the information defining ship A was read into the computer before the information defining ship B, and if neither has defined priority over the other and both are in the same state (i.e., both in stream, both new arrivals, or both needing utilities), ship A is always serviced before ship B, regardless of type or class.

2.5 Berthing Implementation

If the ship index is not 15, 29, 30, 31, 36, 37, 38, or 39; i.e., if the ship is not an AGSS, AGS, CGN, CC, CAG, CG, CA, CLG, DXGN, DXG, DDG, DD, DDE, DLGN, DLG, DL, DEG, DE, SS, SSBN, or SSN, then the berthing is implemented according to paragraph 2.5.1. If the ship is one of those listed above, the berthing implementation is slightly different, as discussed in paragraph 2.5.2.

2.5.1. For ships other than those listed above, an attempt is made to place the ship at a first-preference berth (i.e., a berth whose frames are assigned as first preference the specific index describing that ship type, see Table 4), pierside with full utilities (unless the ship is a tender returning from shipyard maintenance, in which case it will be berthed at a first-preference berth with no utilities). The attempt is made starting at the first frame and continuing in order to the last frame. If full utilities are not available and the ship will be in port for less than three days, then the ship is berthed at a first-preference berth without utilities. If no first-preference berth is available with full utilities, and if the ship does not require priority berthing, then an attempt is made to berth the ship at a first-preference berth without utilities.

If no first-preference berth is available and the ship is a tender, then first-preference berthing is reserved for it. No other ships can berth at that berth until the tender is berthed. In other

cases, an attempt is made to berth the ship at any other allowed berth with utilities. For ships of these types, frames with the four other "preferences" are considered by frame serial number with no order of preference. If no berthing with utilities is available, an attempt is made to berth the ship without utilities.

If no pierside berthing is available, an attempt is made to nest the ship with full utilities, treating the five frame preferences by frame serial number without regard to order. If this cannot be done, an attempt is made to nest the ship with no utilities. If this fails, then the ship is placed in the stream.

2.5.2. If the ship index is one of those eight cited at the beginning of Section 2.5, then the berthing implementation is slightly modified. The order of the berthing attempts is:

(1) first-preference pierside with full utilities
(2) first-preference nested with full utilities
(3) second-preference pierside with full utilities
(4) second-preference nested with full utilities
(5) first-preference pierside without utilitites
(6) first-preference nested without utilities
(7) second-preference pierside without utilities
(8) second-preference nested without utilities.

For a ship that will be in port less than three days, the first available allowable berth is selected, according to the above scheme, but as noted previously, the ship is given no utilities. If no berth is available according to the above scheme, then berthing protocol is the same as in paragraph 2.5.1.

3. MODEL OPERATION

3.1 Distributions

The times a ship spends in overhaul, between overhauls, on extended operations, and between extended operations are obtained by means of a sample from a normal distribution. Given a mean μ and a standard deviation σ, a sample value S from a normal distribution can be approximated by

$$S = \mu + \sigma * \sum_{i=1}^{12} (R_i - \frac{1}{2})$$

where R_i are independent random numbers between zero and one.[2]

At the beginning of each quarter, the time remaining before a ship requires tender maintenance for that quarter (91 days) is calculated from a uniform distribution, i.e.,

$$T = R * 91$$

where T is the time remaining before a ship requires tender maintenance and R is a random number between zero and one. If the ship was tied up to a tender at the beginning of a quarter, or if a ship returned from extended operations or from shipyard maintenance during the quarter, it is assumed to require no tender maintenance for that quarter. The time spent at a tender is either two or three weeks as specified in the input data. The distributions were selected because they approximated reality. NAVFAC provided the means and standard deviations for each distribution for each ship, based on previous observations and an analysis of the port logs. Examples of these means and standard deviations are provided as part of the sample input in Appendix C.

On the basis of a seven-day week, the probability that a ship will be in port for the weekend is 0.9, and the probability that it will be out is 0.1. If the ship is to be in port for the weekend,

2. Hammersley, J.M., and Handscomb, D.C., Monte Carlo Methods, Barnes & Noble, Inc., New York, 1964, pp 39-40.

then the number of days out is calculated by random-number selection from a uniform distribution which varies according to the day of the week on which the ship is going out. If the ship is to depart on Monday, the values range from one to four days. If the ship is to depart on Tuesday, the values range from one to three days, etc. If the ship is to be out for the weekend, then the number of days out is calculated by random-number selection from a uniform distribution which again varies according to the departure day. If the ship is to depart on Monday, the values range from seven to 11 days. If the ship is to depart on Tuesday, the values range from seven to ten days, etc.

A ship coming into port during the week will remain there for the weekend. Its departure day the next week is calculated by random-number selection from a uniform distribution over the following Monday to the following Thursday.

3.2 Initialization

Prior to the beginning of the simulation, the system is initialized by placing each ship in one of the system states by a Monte Carlo method, as explained below. The baseline distribution of the ships in the system was determined by NAVFAC, and is based on an analysis of port control logs. The baseline distribution is as follows: initially one-third of the ships are on extended operations and two-thirds on normal operations or in port. The ships on normal operations or in port (66% of all ships) are further divided as follows: 8% (of all the ships) are in overhaul, 5% are in priority cold iron preparing for overseas movement, 5% are in priority cold iron for 30-day stand-down, 4.8% are on short deployment, and the remaining 43.2% are in port requiring normal berthing. The distribution of the last 48% is obtained by assuming day zero to be Sunday, hence 10% of the ships are out of port on normal operations and 90% are in port.

The initialization of the program is implemented by selecting a random number and comparing it to the baseline distribution for each ship. For example, if the random number R satisfied $0 \leq R \leq .08$, the ship was placed in overhaul; if $.08 < R \leq .13$, the ship was placed on POM, etc. No ships are initially tied up to a tender.

The values for the tables specifying the times remaining until a ship goes on extended operations, into overhaul, or to a tender are initialized for the time remaining until extended operations as follows: for each ship, a sample value is taken from the appropriate normal distribution. (See Appendix C for examples.) Then 21 days are subtracted from this value to allow time for preparing for overseas movement. (The same effect could be obtained by subtracting 21 from the mean when it is stored in the ship characteristics table.) This sample value is then initialized by multiplying it by a random number between 0 and 1. The sample value represents the original calculated value. "Initializing" it by multiplying it by a random number is required to simulate calculating the sample at a random past time. For the time remaining until overhaul for each ship, a similar sample value is taken from the appropriate normal distribution and is initialized. If the ship is on normal operations and not in overhaul or priority cold iron, it will go to a tender during the quarter if an appropriate tender is available. In this case, the 90-day period is multiplied by a random number, rounded to the next highest integer, and stored in a table.

The number of days remaining in each initial state is similarly initialized as follows: for ships on extended operations or in overhaul, a sample value is taken from the normal distribution specifying the duration of stay in that state and is then multiplied by a random number between 0 and 1. If the ship is in priority cold iron, the 30- or 21-day value is similarly initialized for the time required to return from 30-day stand-down or to prepare for overseas movement.

If the ship is out on normal operations, its return to the port during the week is equally probable for each day, and the day of its return is calculated by dividing a random number between 0 and 1 by 0.2 and rounding to the next highest integer. If the ship is in port on day zero, it will be ready to depart on one of the next four days (i.e., Monday through Thursday, since the ship will not depart from the port on Friday, Saturday, or Sunday). The day of its departure is calculated by dividing a random number by 0.25 and rounding to the next highest integer. The calculated time is rounded upward in each case by adding 1 and truncating.

Tenders represent a special case. A tender whose "class" designation (program terminology, not to be confused with normal ship class designations; see Section 4) begins with a 2 (e.g., 2.1) will not go on extended operations at all; a tender whose class designation begins with a 1 will deploy. The class designations are used to prevent all tenders of the same class from being away from the port at the same time and thus leaving no tenders to provide maintenance. Only the right side of the decimal is compared, so that tenders with class designations 2.1 and 1.1 are considered the same except for deployment. All tenders will remain in port when on normal operations, except when in overhaul. All tenders can perform maintenance when on normal operations, except when in priority cold iron or in overhaul.

3.3 Daily Ship State Changes

At the beginning of each day, the tables designating for each ship the time remaining in the present state, the time remaining in normal operations, the time until tender maintenance is required, and the time remaining until overhaul, are decremented (reduced by 1) for each ship. If the time remaining for a ship in its present state is not zero after the decrementing, no state change is made, regardless of the values of the other tables, which therefore may now be negative.

The daily state changes follow the structure shown previously in Figure 1. If a ship may enter more than one state, the states have the following hierarchy: overhaul, POM or extended operations, tender maintenance, and lastly, normal operations. Monte Carlo methods are used to determine which of two states with equal priority is chosen; i.e., in or out of port for normal operations.

A ship returning from extended operations is placed in the arrival queue with a priority status. This is implemented by effectively adding 100 to its ship index. When implementing the berthing operation, a ship whose index is greater than 100 has priority. A sample value is taken from the normal distribution for the amount of time to be spent in normal operations and stored in the proper table. The value in the table for the time remaining until tender maintenance is required is reset so that the ship will not go to a tender during the present quarter.

A ship in a normal operations cycle in port may go to a shipyard, to POM, to a tender, or on a short deployment out of the port. It will go to a shipyard if the value specifying the time to go to a shipyard is less than or equal to zero.* In this case, the ship releases its berth and utilities, if it has any, and is considered to be in the shipyard. The duration of its stay is determined by a sample from the corresponding normal distribution.

If the ship is not going to a shipyard and the value specifying the time remaining before the ship goes on extended operations is less than or equal to zero, the ship will go to POM. If it has a berth which can provide adequate utilities, the ship is given priority status and remains in its berth. The priority status is implemented by adding 200 to the ship index. If the utilities are not then available, it

---

* Note: Values of time remaining before the ship goes to a shipyard (tender or POM) selected from the appropriate normal distribution as described above are always greater than zero. Nevertheless, such times will usually be overexpended and hence go negative, since the program will not change states until the time for a ship to remain in its present state is zero.

waits for them. If its berth cannot provide adequate utilities, the ship releases its berth, is given priority status, and is placed in the arrival queue. It is similarly given priority status if it is waiting in the stream.

If the ship is not going to the shipyard or POM, and if the value for the time to go to the tender is less than or equal to zero, a check is made to see if a tender in service can service the ship. If not, the ship ignores going to the tender during this particular quarter and will go on a short deployment out of port. If a tender is available, a check is made to see if there is room for the ship. If not, the ship remains in its present position waiting for the tender to become available and continues using pier utilities or continues waiting in the stream. If the ship can go to the tender, it releases its berth and utilities, if it has any, and immediately goes to the tender for two or three weeks, as specified in the ship table discussed earlier.

If the ship is to go to none of these three states, it goes out on a short deployment and releases its berth and utilities, if it had any. The duration of its stay out of port depends on the departure day as already explained.

A ship on normal operations returning from a short deployment goes through a similar process, except that it has no berth or utilities to give up. If it is not going to a shipyard or tender, it is placed in the arrival queue and is given priority status if entering POM. It will stay in port, if it is not going to a shipyard, a tender, or to POM, until the following week, and will depart on one of four days, as explained earlier.

A ship coming out of shipyard maintenance will go directly on extended operations if the value in that time-remaining table is less than or equal to zero, or it may go on a short deployment out of port, or it may be placed in the arrival queue for berthing according to a random number selection. A new sample is selected from the normal distribution for the time remaining until the next overhaul and stored in the correct table.

A ship coming out of 30-day stand-down (priority cold-iron maintenance required at the completion of extended operations) is similar to a ship on normal operations in port, and may continue in cold iron. Alternatively, it may go out on a short deployment or it may go to a shipyard, thereby releasing its berth and its utilities. The ship will remain in port in cold iron if the 30-day period ends on a Friday, Saturday, or Sunday. It will not go to a tender during the present quarter.

A ship coming out of POM goes directly on extended operations and releases its berth and utilities. The time of deployment is selected from the normal distribution as specified in the ship table discussed earlier.

A ship at a tender can go to a shipyard, on extended operations, or on normal operations deployment. If it is to go on extended operations, it will remain at the tender for a total of three weeks, regardless of the time specified for tender maintenance in the ship table. Otherwise it will release its berth and utilities and go either to a shipyard or on a short deployment.

After all incoming ships have been processed and all outgoing ships have released their berths, utilities are given to those ships berthed with inadequate utilities (no utilities or less than the ship requires), if utilities are available. The ships in the stream or in the arrival queue are berthed as defined earlier.

At the end of a quarter, new times for ships to wait for tender maintenance are calculated.

4. INPUT

Input to the Port Berthing Simulation program consists of a control card, a set of frame-definition cards, and a set of pier-definition cards.

The control card contains information defining the simulation run and specifying the print options, as shown in Table 2.

TABLE 2 - CONTROL CARD FORMAT

Col	Variable Name	Remarks
1-3	K1	Number of ships
4-6	K2	Number of frames
7-9	K3	Number of piers
10-11	NQ	Number of quarters program is to run (maximum of 24)
12	IJ1	Print Option 0 = Selective printing of daily reports, as determined by IJ6, IJ7, and IJ9 1 = Print all daily reports. If no daily reports are desired, leave card columns 12-34 and column 36 blank.
13-16	IJ2	Day to start initial printing of daily reports (if any)
17-20	I2J	Number of days to print initially
21-24	IJ3	Number of days to skip printing after initial printing
25-28	IJ4	Number of days to print after the count specified by IJ3 or I4J is reached.
29-32	I4J	Number of days to skip after the count specified by IJ4 is reached.

(Note: IJ4 and I4J are repeated throughout the remainder of the run. The following report options enable the user to select the reports printed, depending on settings of above variables.)

Table 2 (continued)

Col	Variable Name	Remarks
33	IJ6	0 = No printing of HSHIP matrix report 1 = HSHIP matrix printed if day is to have printing
34	IJ7	0 = No printing of frame matrix 1 = Printing of frame matrix if day is to have printing
35	IJ8	0 = No printing of quarterly summary 1 = Printing of quarterly summary
36	IJ9	0 = No printing of port log 1 = Printing of port log
37-52	IPORT	Name of port (16 alphanumeric characters)

The next set of cards comprises the ship-definition cards which constitute the SHIP Table. These are read-in as shown in Table 3.

TABLE 3 - SHIP CARDS

Col	Definition	Remarks
1-3	Ship number	Assigned in sequential order in the ship matrix.
4-7	Ship type	Up to 4 alphanumeric characters
8-9	Sequence number	= 1 if first ship of type (as specified in card columns 4-7) = 2 if 2nd ship of same type Etc. (1 card per ship)
10-12	Ship classification	= 0 not tender = 1.1, General tender (AR) = 1.2, Sub tender (AS) = 1.3, destroyer or auxiliary tender (AD) = 2.1, 2.2, 2.3, similar to 1.1, 1.2, and 1.3, respectively, except that if the classification is greater than 2, tender leaves port only for shipyard overhaul.
13-16	Mean for duration of normal operations	In months
17-19	Standard deviation for duration of normal operations	In months
20-23	Mean for duration of extended operations	In months
24-26	Standard deviation duration of extended operations	In months
27-30	Mean for duration of overhaul	In months

Table 3 (continued)

Col	Definition	Remarks
31-33	Standard deviation for duration of overhaul	In months
34-37	Mean for time between overhauls	In months
38-40	Standard deviation for time between overhauls	In months
41-44	Days at tender	Generally 14 or 21
45-48	Electric power required	In units of 100 kw
49-52	Steam required	In units of 100 lb/hr
53-54	Frames required	
55	Nesting capability	Number of ships that can nest outside defined ship
56-59	Electric power furnished	Capability if tender (kw)
60-63	Steam furnished	Capability if tender (lb/hr)
64-67	Ship index	See Table 1

The next set of cards comprises the frame-definition cards which specify the FRAME Table. These are read-in as shown in Table 4.

TABLE 4 - FRAME-DEFINITION CARDS

Col	Variable Name	Description
1-3	IA	Frame number
4	FRAME (IA,1)	Availability = 1, available = 2, occupied
5-7	FRAME (IA,2)	Amount of steam available (lb/hr)
8-10	FRAME (IA,3)	Amount of electric power available (kw)
14	FRAME (IA,4)	Number permitted to nest
15-16	FRAME (IA,5)	1st-preference ship index
17-18	FRAME (IA,6)	2nd-preference ship index
19-20	FRAME (IA,7)	3rd-preference ship index
21-22	FRAME (IA,8)	4th-preference ship index
23-24	FRAME (IA,9)	5th-preference ship index
25	FRAME (IA,10)	End of pier code
43-44	FRAME (IA,17)	Pier number

The last set of input cards contains the PIER description data. These are read-in as shown in Table 5.

TABLE 5 - PIER DESCRIPTION CARDS

Col	Name	Description
1-2	IA	Pier number
2-5	PIER (IA, 1)	Total steam available
9-11	PIER (IA, 3)	Amount of electric power available

Sample input is shown in Appendix C.

5. OUTPUT

As data are read in, a validity check is made. If an error in the data is detected, an error message is printed out and the program stops. If no error is detected, a search is made to see if a berth and adequate utilities are available for each ship. If not, a warning message is printed out.

The input data defining the ships and frames are printed out. After the initialization, the frame matrix is again printed out. If no printing is requested on the control card, only the final summary page is printed out. Sample output is shown in Appendix D.

6. RECOMMENDATIONS FOR FUTURE DEVELOPMENT

Production runs of this model have indicated the possibility that ships have on occasion waited overly long for priority cold iron when tied up at a berth which has much nesting. This is a model flaw and should be investigated. The handling of ships waiting for a tender also needs improvement. Currently, these ships remain in their present state while waiting for the tender to become available, and the tender queue has no priority to it. The reservation system for tenders should possibly be changed to move non-priority ships away from the pier to make room for the tender. Rarely should a tender have to wait for a berth.

ACKNOWLEDGMENTS

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APPENDIX A

PROGRAM LISTING

Appendix A contains a listing of the port simulation computer program.

```
      PROGRAM SHIPIN(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT)                 SHIP  1
      COMMON /COM1/ G,HF,IDAYS,K1,K2,M51,N,FRAME(350,17),HSHIP(150,6),      SHIP  2
     1PIER(25,8),SHIP(150,22),STREAM(80,2)                                  SHIP  3
      COMMON /COM2/ IJ1,IJ2,I2J,IJ3,IJ4,I4J,IJ6,IJ7,IJ8,IJ9,NO              SHI   5
      DIMENSION ARRV(150,3), NODAYS(150,3), IDSTAT(150,14,2), STREAM(80,    SHI   6
     12), TNUSTR(350,2), IPORT(2), IUNIT(3)                                 SHI   7
      INTEGER HSHIP,G,HF,CTR1,U                                             SHI   8
      DATA BLANK/10H         /                                              SHI   9
C     ********************* INITIALIZE VARIABLES *********************      SHI  10
C     ********************* AND HSHIP MATRIX *************************      SHI  11
      M51=0                                                                 SHI  12
      G=0                                                                   SHI  13
      HF=0                                                                  SHI  14
      RST=1.                                                                SHI  15
      ICUT=0                                                                SHI  16
      NUMED=0                                                               SHI  17
      DO 10 I=1,150                                                         SHI  18
      DO 10 J=1,6                                                           SHI  19
   10 HSHIP(I,J)=0                                                          SHI  20
C     ********************* READ CONTROL CARD ************************      SHI  21
      READ 1420, K1,K2,K3,NO,IJ1,IJ2,I2J,IJ3,IJ4,I4J,IJ6,IJ7,IJ8,IJ9,IPCSHI  22
     1RT,(IUNIT(I),I=1,3)                                                   SHI  23
      IDYLST=NO*91                                                          SHI  24
      U=5                                                                   SHI  25
C     **** READ IN SHIP CARDS***********                                    SHI  26
      DO 30 IE=1,K1                                                         SHI  27
      READ 1430, (SHIP(IE,J),J=1,22)                                       SHI  28
      DO 20 J=5,12                                                          SHI  29
   20 SHIP(IE,J)=SHIP(IE,J)*30.                                             SHI  30
      SHIP(IE,1)=IE                                                         SHI  31
   30 HSHIP(IE,1)=IE                                                        SHI  32
      DO 40 I=1,K1                                                          SHI  33
      IF (MOD(I,50).NE.1) GO TO 40                                          SHI  34
      PRINT 1440, IPORT                                                     SHI  35
      PRINT 1450                                                            SHI  36
   40 PRINT 1460, (SHIP(I,J),J=1,20)                                        SHI  37
C     ********************* READ FRAME CARDS *************************      SHI  38
      DO 50 I=1,K2                                                          SHI  39
      READ (U,1470) IA,(FRAME(I,J),J=1,17)                                  SHI  40
      IF (IA.EQ.I) GO TO 50                                                 SHI  41
      PRINT 1480                                                            SHI  42
      CTR1=I                                                                SHI  43
      GO TO 330                                                             SHI  44
   50 CONTINUE                                                              SHI  45
C     ********************* READ PIER CARDS **************************      SHI  46
      DO 60 I=1,K3                                                          SHI  47
      READ (U,1490) IA,(PIER(I,J),J=1,8)                                    SHI  48
      IF (IA.EQ.I) GO TO 60                                                 SHI  49
      PRINT 1500                                                            SHI  50
      CTR1=I                                                                SHI  51
      GO TO 330                                                             SHI  52
   60 CONTINUE                                                              SHI  53
C     ********************* PRINT FRAMES  ****************************      SHI  54
      DO 110 I=1,K1                                                         SHI  55
      CTRL=0.                                                               SHI  56
```

```
      DO 90 J=1,K2
      DO 70 K=5,9
      IF (SHIP(I,20).EQ.FRAME(J,K)) GO TO 80
   70 CONTINUE
      GO TO 90
C     BERTHING IS AVAILABLE - CHECK FOR ADEQUATE UTILITIES
   80 CTRL=1.
C     CHECK STEAM
      IF (SHIP(I,15).GT.FRAME(J,2)) GO TO 90
C     CHECK AC
      IF (SHIP(I,14).LE.FRAME(J,3)) GO TO 110
   90 CONTINUE
C     ALL FRAMES PROCESSED
      IF (CTRL.EQ.0.0) GO TO 100
C     INADEQUATE UTILITIES
      WRITE (6,1510) I
      GO TO 110
C     NO BERTHING AVAILABLE
  100 WRITE (6,1520) I
  110 CONTINUE
C     **************** INITIALIZE VARIABLES FOR ASSIGNMENT * ********
      IQ=0
      CALL PRTPR (IPORT,IQ,IQ)
      M=0
      NUMNI=0
      NUMCI=0
      NUMNC=0
      DIST=0.
      NMIOVR=0
C     **************** CLEAR ARRAYS ********************************
      DO 130 I=1,K1
      DO 120 J=1,14
      IDSTAT(I,J,1)=0
  120 IOSTAT(I,J,2)=0
      DO 130 J=1,3
      NODAYS(I,J)=0
  130 ARRV(I,J)=0.
C     **************** CAPTURE UTILITIES AT PIER WHERE ***************
C     **************** TENDER IS DEDICATED ***************************
      DO 150 I=1,K1
      IF (SHIP(I,4).LE.0..OR.SHIP(I,4).GE.3.) GO TO 150
C     **************** SHIP IS A TENDER SO SAVE PRIORITY *************
      PR=SHIP(I,20)
C     **************** SEARCH FRAME MATRIX FOR THIS PRIORITY **********
C     **************** AND SAVE UTILITIES IN MATRIX TNUSTR *************
      DO 140 J=1,K2
      IF (FRAME(J,5).NE.PR) GO TO 140
      TNUSTR(J,1)=FRAME(J,2)
      TNUSTR(J,2)=FRAME(J,3)
  140 CONTINUE
  150 CONTINUE
C     ******************** INITIALIZE SHIPS ************************
      DO 290 I=1,K1
C     **************** GET NORMAL DISTRIBUTION *********************
      MEAN=SHIP(I,5)
```

```
                STANCV=SHIP(I,6)                                                  SHI 112
                CALL NORMAL (DIST,MEAN,STANCV,RST)                                SHI 113
          C     ********************* SMOOTH IT ******************************    SHI 114
                DIST=DIST-21.                                                     SHI 115
115             IF (DIST.LE.0) DIST=0.                                            SHI 116
                YELP=RANF(RST)                                                    SHI 117
                DIST1=DIST*YELP+1.                                                SHI 118
          C     ********************* GET NO. OF DAYS UNTIL NOR OPS ************  SHI 119
                NODAYS(I,3)=DIST1                                                 SHI 120
120             IF (SHIP(I,4).GT.2) NODAYS(I,3)=91*NO+1                           SHI 121
                YEL=RANF(RST)                                                     SHI 122
          C     ***************** CHECK IF SHIP IS IN OVERHAUL *****************  SHI 123
                IF (YEL.LE..08) GO TO 200                                         SHI 124
          C     ***************** GET NO. OF DAYS UNTIL OVERHAUL ***************  SHI 125
125             MEAN=SHIP(I,11)                                                   SHI 126
                STANCV=SHIP(I,12)                                                 SHI 127
                CALL NORMAL (DIST1,MEAN,STANCV,RST)                               SHI 128
                YELP=RANF(RST)                                                    SHI 129
                NODAYS(I,1)=DIST1*YELP+1.                                         SHI 130
130             IF (SHIP(I,4).GT.2.) GO TO 160                                    SHI 131
          C     ********************* CHECK IF SHIP IN FCM *********************  SHI 132
                IF (YEL.LE..13) GO TO 270                                         SHI 133
          C     ********************* CHECK IF SHIP ON EXT OPS *****************  SHI 134
                IF (YEL.LE..46333) GO TO 210                                      SHI 135
135       C     *************CHECK IF SHIP IN CCLD IRON*************************  SHI 136
                IF (YEL.LE..51333) GO TO 230                                      SHI 137
          C     ********************* IS SHIP A TENDER *************************  SHI 138
                IF (SHIP(I,4).GE.1..AND.SHIP(I,4).LT.2.) GO TO 170                SHI 139
          C     ***************** SHIP IS NOT A TENDER SO GET NO. **************  SHI 140
140       C     ***************** OF DAYS UNTIL GOES TO TENDER *****************  SHI 141
                YEL=RANF(RST)                                                     SHI 142
                NODAYS(I,2)=90.*YEL+1.                                            SHI 143
          C     ***************** SHIP IS ON NOR OPS.  IT IS NOT A TENDER ******  SHI 144
                YEL=RANF(RST)                                                     SHI 145
145             YELP=RANF(RST)                                                    SHI 146
          C     ***************** CHECK IF SHIP ON NOR OPS IS OUT OR IN *********  SHI 147
                IF (YELP.LE..9) GO TO 180                                         SHI 148
          C     ***************** SHIP ON NOR OPS IS OUT ON WEEKLY OPS **********  SHI 149
                IODAYS=YEL/.2+1.                                                  SHI 150
150             NUMNO=NUMNO+1                                                     SHI 151
                HSHIP(I,2)=2                                                      SHI 152
                HSHIP(I,3)=IODAYS                                                 SHI 153
                HSHIP(I,4)=0                                                      SHI 154
                HSHIP(I,6)=2                                                      SHI 155
155             GO TO 290                                                         SHI 156
          C     ********************* SHIP IS A TENDER *************************  SHI 157
          160   SHIP(I,4)=SHIP(I,4)-1.                                            SHI 158
          170   IODAYS=DIST1                                                      SHI 159
                HSHIP(I,6)=6                                                      SHI 160
160             IF (IODAYS.GT.NODAYS(I,3)) IODAYS=NODAYS(I,3)                     SHI 161
                GO TO 190                                                         SHI 162
          C     ***************** SHIP IS ON NOR OPS IN PORT *******************  SHI 163
          180   IODAYS=YEL/.25+1.                                                 SHI 164
                HSHIP(I,6)=2                                                      SHI 165
165       190   NUMNI=NUMNI+1                                                     SHI 166
```

```
                HSHIP(I,2)=1                                                    SHI 167
                M=M+1                                                           SHI 168
                ARRV(M,1)=I                                                     SHI 169
                ARRV(M,2)=SHIP(I,20)                                            SHI 170
170             HSHIP(I,3)=IDAYS                                                SHI 171
                GO TO 290                                                       SHI 172
          C     ********************* SHIP IS IN OVERHAUL **********************  SHI 173
          200   MEAN=SHIP(I,9)                                                  SHI 174
                STANDV=SHIP(I,10)                                               SHI 175
175             CALL NORMAL (DIST,MEAN,STANDV,RST)                              SHI 176
                YFL=RANF(RST)                                                   SHI 177
          C     ************ SET IDAYS IS DAYS TO GO IN OVERHALL ***************  SHI 178
                IDAYS=DIST*YFL+1.                                               SHI 179
                HSHIP(I,2)=2                                                    SHI 180
180             HSHIP(I,3)=IDAYS                                                SHI 181
                HSHIP(I,4)=12                                                   SHI 182
                HSHIP(I,6)=3                                                    SHI 183
                IF (HSHIP(I,3).GE.NODAYS(I,3)) SHIP(I,20)=SHIP(I,20)+100        SHI 184
          C     ****** INCR. CTR  FOR NO. OF SHIPS IN OVERHAUL ********************SHI 185
185             NMIOVR=NMIOVR+1                                                 SHI 186
                GO TO 290                                                       SHI 187
          C     ********************* SHIP ON EXT CPS ************************** SHI 188
          210   IF (SHIP(I,4).NE.0.) GO TO 250                                  SHI 189
          220   MEAN=SHIP(I,7)                                                  SHI 190
190             STANDV=SHIP(I,8)                                                SHI 191
                CALL NORMAL (DIST,MEAN,STANDV,RST)                              SHI 192
                YFL=RANF(RST)                                                   SHI 193
          C     ***************** GET DAYS TO GO ON EXT CPS ********************  SHI 194
                IDAYS=DIST*YFL+1.                                               SHI 195
195       C     ***************** INCR. CTR FOR SHIPS ON EXT CPS ***************  SHI 196
                NUMEC=NUMEO+1                                                   SHI 197
                SHIP(I,20)=SHIP(I,20)+100.                                      SHI 198
                HSHIP(I,2)=2                                                    SHI 199
                HSHIP(I,3)=IDAYS                                                SHI 200
200             HSHIP(I,4)=0                                                    SHI 201
                HSHIP(I,6)=1                                                    SHI 202
                GO TO 290                                                       SHI 203
          C     ********************* SHIP IN C.I. STATE ************************  SHI 204
          230   YFL=RANF(RST)                                                   SHI 205
205             NODAYS(I,3)=DIST                                                SHI 206
                DIST1=YFL*30.+1.                                                SHI 207
          C     ************ SET DAYS TO GO UNTIL SHIP GOES ON NOR CPS **********  SHI 208
                NODAYS(I,3)=NODAYS(I,3)-(30.-DIST1)                             SHI 209
                IF (NODAYS(I,3).LE.0) NODAYS(I,3)=1                             SHI 210
210             HSHIP(I,3)=DIST1                                                SHI 211
          C     ****** CHECK IF DAYS TO GO IN C.I. IS LE TO DAYS ***************  SHI 212
          C     ****** UNTIL SHIP GOES ON NOR CPS ******************************  SHI 213
                IF (HSHIP(I,3).LE.NODAYS(I,3)) GO TO 240                        SHI 214
          C     ***************** RESET NODAYS TO DAYS TO GO IN C.I. **************SHI 215
215             NODAYS(I,3)=HSHIP(I,3)                                          SHI 216
          240   NUMCI=NUMCI+1                                                   SHI 217
                NUMNI=NUMNI+1                                                   SHI 218
                M=M+1                                                           SHI 219
                SHIP(I,20)=SHIP(I,20)+100.                                      SHI 220
220             ARRV(M,1)=I                                                     SHI 221
```

```
                ARRV(M,2)=SHIP(I,20)                                              SHI 222
                HSHIP(I,2)=1                                                      SHI 223
                HSHIP(I,6)=4                                                      SHI 224
                GO TO 290                                                         SHI 225
225         250 DO 260 J=1,I                                                      SHI 226
                IF (SHIP(J,4).EQ.0.) GO TO 260                                    SHI 227
                IF (HSHIP(J,6).EQ.6.AND.SHIP(I,4).EQ.SHIP(J,4)) GO TO 260         SHI 228
                NODAYS(I,3)=1                                                     SHI 229
                HSHIP(I,3)=1                                                      SHI 230
230             GO TO 170                                                         SHI 231
            260 CONTINUE                                                          SHI 232
                IF (YEL.LE.0.13) GO TO 280                                        SHI 233
                GO TO 220                                                         SHI 234
            C   ********************* SHIP IN PCH ******************************* SHI 235
235         270 IF (SHIP(I,4).NE.0.) GO TO 250                                    SHI 236
            280 YEL=RANF(RST)                                                     SHI 237
                IDAYS=YEL*21.+1.                                                  SHI 238
                NUMCI=NUMCI+1                                                     SHI 239
                NUMNI=NUMNI+1                                                     SHI 240
240             M=M+1                                                             SHI 241
                SHIP(I,20)=SHIP(I,20)+200.                                        SHI 242
                ARRV(M,1)=I                                                       SHI 243
                ARRV(M,2)=SHIP(I,20)                                              SHI 244
                HSHIP(I,2)=1                                                      SHI 245
245             HSHIP(I,3)=IDAYS                                                  SHI 246
                HSHIP(I,6)=5                                                      SHI 247
            290 CONTINUE                                                          SHI 248
            C   ***************** LEAVING THE ASSIGNMENT STAGE ****************** SHI 249
                PRINT 1530                                                        SHI 250
250             DO 300 I=1,M                                                      SHI 251
                N=ARRV(I,1)                                                       SHI 252
                IF (SHIP(N,4).LE.0) GO TO 300                                     SHI 253
            C   ****** SHIP IS A TENDER -- PLACE IT FIRST IF IN ***************** SHI 254
            C   ****** PORT AND AVAILABLE TO FURNISH UTILITIES ****************** SHI 255
255             IF (HSHIP(N,2).NE.1) GO TO 300                                    SHI 256
            C   ********************* SHIP IS IN ******************************** SHI 257
                IF (HSHIP(N,6).NE.6) GO TO 300                                    SHI 258
            C   *********** SHIP IS A TENDER AND AVAILABLE ********************** SHI 259
                IDAYS=3                                                           SHI 260
260             IJGA=0                                                            SHI 261
                CALL PLACE (IJGA)                                                 SHI 262
                HSHIP(N,4)=G                                                      SHI 263
                HSHIP(N,5)=HF                                                     SHI 264
                ARRV(I,2)=0.                                                      SHI 265
265         300 CONTINUE                                                          SHI 266
                A=200.                                                            SHI 267
                DO 320 I=1,2                                                      SHI 268
            C   ***************** PLACE C.I. AND PCH NEXT ********************** SHI 269
                A=A-100.                                                          SHI 270
270             DO 320 K=1,M                                                      SHI 271
                IF (A.LT.ARRV(K,2)) GO TO 310                                     SHI 272
                GO TO 320                                                         SHI 273
            310 N=ARRV(K,1)                                                       SHI 274
                IDAYS=3                                                           SHI 275
275             IJGA=0                                                            SHI 276
```

```
                CALL PLACE (IJ9A)                                                SHI 277
                IF (SHIP(N,20).GT.200..AND.G.EQ.11) HSHIP(N,3)=21                SHI 278
                IF (SHIP(N,20).GT.100..AND.G.EQ.11) HSHIP(N,3)=30                SHI 279
                HSHIP(N,4)=G                                                     SHI 280
280             HSHIP(N,5)=HF                                                    SHI 281
                ARRV(K,2)=0.                                                     SHI 282
320             CONTINUE                                                         SHI 283
                IF (IJ2.LE.1.AND.I2J.NE.0) GO TO 340                             SHI 284
                I=1                                                              SHI 285
285             CALL PRTHS (IPORT,I,I)                                           SHI 286
                CALL PRTER (IPORT,I,I)                                           SHI 287
                PRINT 1540                                                       SHI 288
                GO TO 340                                                        SHI 289
C               ***************** ERROR -- FRAME OR PIER CARDS ARE NOT ***********SHI 290
290             ***************** IN CORRECT SEQUENCE ****************************SHI 291
330             PRINT 1550, CTR1,IA                                              SHI 292
                STOP 112                                                         SHI 293
340             ITHDAY=0                                                         SHI 294
                KDAY=-1                                                          SHI 295
295             ******** DO-LOOP BY NUMBER OF QUARTERS **************************SHI 296
                ******************** PGM IS TO RUN ****************************** SHI 297
                DO 1400 IQ=1,NQ                                                  SHI 298
                IX=IQ                                                            SHI 299
                ***************** DO-LOOP BY DAYS/QUARTER ************************SHI 300
300             DO 1340 I=1,91                                                   SHI 301
                IZ1=I                                                            SHI 302
                ITHDAY=ITHDAY+1                                                  SHI 303
                IF (KDAY.GE.6) KDAY=-1                                           SHI 304
                KDAY=KDAY+1                                                      SHI 305
305             ********** RESET COUNTER FOR NUMBER OF ARRIVALS TODAY ********** SHI 306
                M=0                                                              SHI 307
                ***************** CHECK IF TIME TO PRINT *************************SHI 308
                CALL TPONTF (IPORT,ITHDAY,IJ9A,IX,IOYLST)                        SHI 309
                IF (IJ9A.LE.0) GO TO 350                                         SHI 310
310             ** PRINT HEADER FOR PART CONTROL LOG ****************************SHI 311
                PRINT 1560, ITHDAY,IX,IPORT,NUMNI,NUMCI,NUMNC,NMICVR,NUMEQ       SHI 312
                ***************** DO-LOOP BY NUMBER OF SHIPS *********************SHI 313
350             DO 1170 J=1,K1                                                   SHI 314
                ITENDR=0                                                         SHI 315
315             IPCM=0                                                           SHI 316
                JZ1=J                                                            SHI 317
                IFI=0                                                            SHI 318
                IT=0                                                             SHI 319
                IOIS=0                                                           SHI 320
320             ITENO=0                                                          SHI 321
                ICVR=0                                                           SHI 322
C               COUNT DOWN NUMBER OF DAYS TO GO IN PRESENT STATE AND UNTIL NEXT STSHI 323
                HSHIP(J,3)=HSHIP(J,3)-1                                          SHI 324
                NODAYS(J,1)=NODAYS(J,1)-1                                        SHI 325
325             NODAYS(J,2)=NODAYS(J,2)-1                                        SHI 326
                NODAYS(J,3)=NODAYS(J,3)-1                                        SHI 327
C               CHECK TO SEE IF SHIP HAS REACHED THE END OF DAYS TO GO IN PRESENT SHI 328
                IF (HSHIP(J,3).GT.0) GO TO 1170                                  SHI 329
C               CAPTURE PRESENT STATE IN MB ********************************** SHI 330
330             MB=HSHIP(J,6)                                                    SHI 331
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                IF (MB.LE.0.OR.MB.GT.7) GO TO 360                                  SHI 332
                GO TO (370,390,1020,1040,1080,1100,650), MB                        SHI 333
           360  PRINT 1570                                                         SHI 334
                PRINT 1580, J,(SHIP(J,K),K=2,4)                                    SHI 335
      335       STOP 100                                                           SHI 336
           C    SHIP IS LEAVING EXT OPS STATE ************************************SHI 337
           370  NUMEO=NUMEO-1                                                      SHI 338
                MSHIP(J,2)=1                                                       SHI 339
           C    SET DAYS TO GO UNTIL GOES TO TENDER ******************************SHI 340
      340       NODAYS(J,2)=100                                                    SHI 341
                MEAN=SHIP(J,5)                                                     SHI 342
                STANDV=SHIP(J,6)                                                   SHI 343
                CALL NORMAL (DIST,MEAN,STANDV,RST)                                 SHI 344
                DIST=DIST-21.                                                      SHI 345
      345       SET DAYS TO GO UNTIL GOES ON NOR OPS *****************************SHI 346
                NODAYS(J,3)=DIST+0.5                                               SHI 347
           C    SET DAYS TO GO IN STANDDOWN **************************************SHI 348
                MSHIP(J,3)=30                                                      SHI 349
           C    SET STATE TO C. I. ***********************************************SHI 350
      350       MSHIP(J,6)=4                                                       SHI 351
                NUMNI=NUMNI+1                                                      SHI 352
                NUMCI=NUMCI+1                                                      SHI 353
           C    SET ARRIVAL MATRIX ***********************************************SHI 354
           380  M=M+1                                                              SHI 355
      355       ARRV(M,1)=J                                                        SHI 356
                ARRV(M,2)=SHIP(J,20)                                               SHI 357
                GO TO 1170                                                         SHI 358
           C    CHECK IF NOR OPS SHIP THAT IS CHANGING STATE IS GOING IN OR OUT **SHI 359
           390  IF (MSHIP(J,2).EQ.1) GO TO 430                                     SHI 360
      360  C    ********************* SHIP IS COMING IN ***************************SHI 361
                NUMNC=NUMNC-1                                                      SHI 362
           C    *************** CHECK IF TIME TO GO TO OVERHALL ******************SHI 363
                IF (NODAYS(J,1).LE.0) GO TO 730                                    SHI 364
                NUMNI=NUMNI+1                                                      SHI 365
      365  C    ********************* CHECK IF TIME FOR PCM ************************SHI 366
                IF (NODAYS(J,3).LE.0) GO TO 880                                    SHI 367
           C    *************** CHECK IF TIME TO GO TO TENDER ********************SHI 368
                IF (NODAYS(J,2).LE.0) GO TO 750                                    SHI 369
           C    ****** CHECK IF DAYS IN PORT ARE THOSE IN WEEKLY CYCLE ************SHI 370
      370       IF (KDAY.LE.4) GO TO 410                                           SHI 371
                PRINT 1590, J,(SHIP(J,K),K=2,4),KDAY                               SHI 372
                STOP 115                                                           SHI 373
           410  DAY=7-KDAY                                                         SHI 374
                YFL=RANF(RST)                                                      SHI 375
      375       MSHIP(J,3)=4.*YFL+DAY                                              SHI 376
                GO TO 500                                                          SHI 377
           C    ********************* CHECK IF TIME FOR EXT OPS ********************SHI 378
           420  IF (NODAYS(J,3).LE.0) GO TO 880                                    SHI 379
           C    ********************* CHECK IF TIME TO GO TO TENDER ************** SHI 380
      380       IF (NODAYS(J,2).LE.0) GO TO 740                                    SHI 381
                GO TO 440                                                          SHI 382
           C    ********************* CHECK IF TIME TO GO TO OVERHALL ************SHI 383
           430  IF (NODAYS(J,1).GT.0) GO TO 420                                    SHI 384
                IT=1                                                               SHI 385
      385  C    CHECK IF NOR OPS SHIP THAT IS CHANGING STATE HAS AT PIERSIDE ****SHI 386
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      440   IF (HSHIP(J,4).LE.4) GO TO 450                                    SHI 387
      C      CHECK IF NOR OPS SHIP THAT IS CHANGING STATE WAS NESTED AT PIER *SHI 388
            IF (HSHIP(J,4).LE.10) GO TO 470                                   SHI 389
      C      CHECK IF NOR OPS SHIP THAT IS CHANGING STATE WAS IN STREAM ******SHI 390
390         IF (HSHIP(J,4).EQ.11) GO TO 580                                   SHI 391
            PRINT 1600                                                        SHI 392
            PRINT 1580, J,(SHIP(J,K),K=2,4)                                   SHI 393
            STOP 102                                                          SHI 394
      C      SHIP ON NOR OPS, CHANGING STATE WAS AT PIERSIDE *****************SHI 395
395   450   IF (IT.EQ.1) IOVR=1                                               SHI 396
      460   N5=HSHIP(J,5)                                                     SHI 397
            N2=SHIP(J,16)                                                     SHI 398
            GO TO 620                                                         SHI 399
      C      SHIP ON NOR OPS, CHANGING STATE WAS NESTED AT PIER **************SHI 400
400   470   IF (IT.EQ.1) IOVR=1                                               SHI 401
      C      N5 IS HIGHEST FRAME OCCUPIED BY THIS SHIP ***********************SHI 402
      C      N2 IS THE NUMBER OF FRAMES SHIP REQUIRES ************************SHI 403
      C      IFI IS FLAG TO MOVE NESTED SHIP *********************************SHI 404
      480   N5=HSHIP(J,5)                                                     SHI 405
405         N2=SHIP(J,16)                                                     SHI 406
            IFI=1                                                             SHI 407
      C      REDUCE THE NUMBER OF SHIPS NESTED HERE **************************SHI 408
            DO 490 K=1,N2                                                     SHI 409
            FRAME(N5,16)=FRAME(N5,16)-1.                                      SHI 410
410   490   N5=N5-1                                                           SHI 411
            N5=HSHIP(J,5)                                                     SHI 412
      C      CHECK IF SHIP NESTED HAD C. I., PARTIAL UTILITIES OR NO UTILITIESSHI 413
            IF (HSHIP(J,4).EQ.5.OR.HSHIP(J,4).EQ.8) GO TO 680                 SHI 414
            IF (HSHIP(J,4).EQ.6.OR.HSHIP(J,4).EQ.9) GO TO 700                 SHI 415
415   C      SHIP NESTED HAD NO UTILITIES ************************************SHI 416
            N5=HSHIP(J,5)                                                     SHI 417
      500   SHIP(J,22)=0.                                                     SHI 418
            SHIP(J,21)=0.                                                     SHI 419
            IF (SHIP(J,4).GT.0.0.AND.SHIP(J,20).LT.100..AND.NDDAYS(J,1).GT.0) SHI 420
420        1GO TO 530                                                         SHI 421
      C      CLEAR HIGHEST FRAME THIS SHIP OCCUPIED **************************SHI 422
            HSHIP(J,5)=0                                                      SHI 423
            HSHIP(J,4)=0                                                      SHI 424
      C      CHECK IF IT IS NECESSARY TO REMOVE DEPARTING SHIP FROM FRAMES ANDSHI 425
425   C      SET THOSE FRAMES TO AVAILABLE STATE *****************************SHI 426
            IF (IFI.EQ.1) GO TO 520                                           SHI 427
            IF (XFRAME.GE.0.) GO TO 520                                       SHI 428
            XFRAME=0.                                                         SHI 429
      C      REMOVE DEPARTING SHIP FROM FRAMES AND SET THEM TO AVAILABLE STATESHI 430
430         DO 510 K=1,N2                                                     SHI 431
            FRAME(N5,1)=1.                                                    SHI 432
            FRAME(N5,13)=0.                                                   SHI 433
            FRAME(N5,14)=BLANK                                                SHI 434
            FRAME(N5,15)=0.                                                   SHI 435
435   510   N5=N5-1                                                           SHI 436
      520   IF (IFCM.GE.1) GO TO 980                                          SHI 437
            IF (IOVR.EQ.1) GO TO 720                                          SHI 438
            GO TO 560                                                         SHI 439
      530   DO 540 K=1,N2                                                     SHI 440
440         FRAME(N5,1)=3.                                                    SHI 441
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                FRAME(N5,2)=SHIP(J,19)                                          SHI 442
                FRAME(N5,3)=SHIP(J,18)                                          SHI 443
          540   N5=N5-1                                                         SHI 444
                HSHIP(J,6)=6                                                    SHI 445
445             HSHIP(J,4)=4                                                    SHI 446
          550   HSHIP(J,3)=NCDAYS(J,3)                                          SHI 447
                IF (NCDAYS(J,1).LT.NCDAYS(J,3)) HSHIP(J,3)=NCDAYS(J,1)          SHI 448
                IF (HSHIP(J,6).EQ.6) GO TO 1170                                 SHI 449
                HSHIP(J,2)=1                                                    SHI 450
450             GO TO 380                                                       SHI 451
          C      CHECK IF TIME FOR SHIP TO GO TO OVERHAUL **********************SHI 452
          560   IF (NCDAYS(J,1).LE.0) GO TO 720                                 SHI 453
                IF (NCDAYS(J,3).LE.0) GO TO 900                                 SHI 454
                IF (ITENDR.NE.0) GO TO 1000                                     SHI 455
455       C      SHIP IS GOING OUT ON NCR OPS **********************************SHI 456
                IF (KDAY.LE.3) GO TO 570                                        SHI 457
                PRINT 1610, J,(SHIP(J,K),K=2,4),KDAY                           SHI 458
                STOP 104                                                        SHI 459
          570   DAY=4-KDAY                                                      SHI 463
460             HSHIP(J,2)=2                                                    SHI 464
                HSHIP(J,4)=0                                                    SHI 465
                YFL=RANF(RST)                                                   SHI 466
                YFLP=RANF(RST)                                                  SHI 467
                HSHIP(J,3)=DAY*YFL+8.                                           SHI 468
465             IF (YFLP.LE.0.9) HSHIP(J,3)=DAY*YFL+1.                          SHI 469
                NUMNC=NUMNC+1                                                   SHI 470
                NUMNI=NUMNI-1                                                   SHI 471
                HSHIP(J,6)=2                                                    SHI 472
                GO TO 1170                                                      SHI 473
470       C      SHIP CHANGING STATE WAS IN STREAM *****************************SHI 474
          C      CHECK IF ANY SHIP REALLY THERE ********************************SHI 475
          580   IF (M51.GT.0) GO TO 590                                         SHI 476
                PRINT 1620, J,(SHIP(J,K),K=2,4),M51                            SHI 477
                STOP 105                                                        SHI 478
475       590   IF (M51.LE.80) GO TO 600                                        SHI 479
                PRINT 1630                                                      SHI 480
                STOP 106                                                        SHI 481
          C      LOOK FOR THIS SHIP IN STREAM **********************************SHI 482
          600   ZJ=J                                                            SHI 483
480             DO 610 K=1,M51                                                  SHI 484
                KZ=K                                                            SHI 485
                IF (STREMN(K,1).EQ.ZJ) GO TO 630                                SHI 486
          610   CONTINUE                                                        SHI 487
          C      THIS SHIP SUPPOSED TO BE IN STREAM, IS NOT THERE **************SHI 488
485             PRINT 1640, J,(SHIP(J,K),K=2,4)                                SHI 489
                STOP 107                                                        SHI 490
          C      SHIP GOING OUT WAS AT PIERSIDE ********************************SHI 491
          C      CHECK IF OTHER SHIPS ARE NESTED TO IT *************************SHI 492
          620   IF (FRAME(N5,16).GT.0.) GO TO 640                               SHI 493
490       C      SHIP NOT NESTED ***********************************************SHI 494
          C      ********************** CHANGE FRAMES TO OCCUPIED STATE ***********SHI 495
                DO 630 K=1,N2                                                   SHI 496
          C     CHECK TO SEE IF FRAME IS RESERVED FOR A TENDER                  SHI 497
                IF (FRAME(N5,1).EQ.4.) GO TO 630                                SHI 498
495             FRAME(N5,1)=1.                                                  SHI 499
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      FRAME(N5,13)=0.0
      FRAME(N5,15)=0.0
      FRAME(N5,14)=BLANK
630   N5=N5-1
C      IF SHIP AT PIERSIDE AND LEAVING CHECK IF IT HAD C. I., SOME UTILI
C      OR NO UTILITIES ***********************************************
C      GO TO 91 IF SHIP LEAVING PIERSIDE HAD NO UTILITIES **************
640   N5=HSHIP(J,5)
      XFRAME=FRAME(N5,16)-1.
      IF (HSHIP(J,4).EQ.4) GO TO 500
C      GO TO 69 IF SHIP LEAVING PIERSIDE HAD SOME UTILITIES ************
      IF (HSHIP(J,4).EQ.3) GO TO 700
C      GO TO 68 IF SHIP LEAVING PIERSIDE HAD C. I. *********************
      IF (HSHIP(J,4).EQ.1) GO TO 680
      PRINT 1650, J,(SHIP(J,K),K=2,4),(HSHIP(J,K),K=1,6)
      NUMCI=NUMCI-1
      STOP 110
C     ****************** SHIP LEAVING PIERSIDE IS A TENDER ***********
650   N5=HSHIP(J,5)
      N2=SHIP(J,16)
C     ******** RESTORE UTILTIES AVAILABLE TO THOSE ORIGINALLY AT PIER
      DO 660 K=1,N2
      FRAME(N5,1)=2
      FRAME(N5,2)=TNUSTR(N5,1)
      FRAME(N5,3)=TNUSTR(N5,2)
      FRAME(N5,11)=0.
      FRAME(N5,12)=0.
660   N5=N5-1
      N5=HSHIP(J,5)
C     ******** CHECK IF ANY SHIPS NESTED TO TENDER WHICH IS LEAVING **
      DO 670 K=1,K1
      IF (HSHIP(K,5).NE.N5) GO TO 670
C     ******** CHECK IF THIS IS THE SHIP THAT IS LEAVING ************
      IF (K.EQ.JZ1) GO TO 670
C     ********* CHANGE SHIPS UTILITIES TO 0. THEY WERE NESTED ********
C     ****************** TO DEPARTING TENDER *************************
      SHIP(K,21)=0.
      SHIP(K,22)=0.
      HSHIP(K,4)=7
      NUMCI=NUMCI-1
670   CONTINUE
C     ********** CHECK IF TENDER IS GOING TO OVERHAUL ***************
      IF (NODAYS(J,1).LE.0) GO TO 620
C       *********TENDER IS GOING ON EXTENDED OPERATIONS******
      GO TO 880
C     ************ SHIP NOW GOING OUT HAD COLD IRON ******************
C     ********** SUBTRACT UTILITIES IT HAD FROM UTILITIES IN USE AT **
C     ******************** THOSE FRAMES AND PIER  ********************
680   DO 690 K=1,N2
      FRAME(N5,11)=FRAME(N5,11)-SHIP(JZ1,15)
      FRAME(N5,12)=FRAME(N5,12)-SHIP(JZ1,14)
690   N5=N5-1
      N5=HSHIP(J,5)
      K=FRAME(N5,17)
      PIER(K,2)=PIER(K,2)-SHIP(J,15)
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                FIER(K,4)=FIER(K,4)-SHIP(J,14)                                  SHI 555
                GO TO 500                                                       SHI 556
          C     *************** SHIP NESTED AT FIER HAD PARTIAL UTILITIES ****   SHI 557
          700   DO 710 K=1,N2                                                   SHI 558
555             FRAME(N5,12)=FRAME(N5,12)-SHIP(JZ1,22)                          SHI 559
                FRAME(N5,11)=FRAME(N5,11)-SHIP(JZ1,21)                          SHI 560
          710   N5=N5-1                                                         SHI 561
                N5=HSHIP(J,5)                                                   SHI 562
                K=FRAME(N5,17)                                                  SHI 563
560             FIER(K,4)=FIER(K,4)-SHIP(J,22)                                  SHI 564
                FIER(K,2)=FIER(K,2)-SHIP(J,21)                                  SHI 565
                GO TO 500                                                       SHI 566
          C     ********** THIS SHIP IS GOING TO OVERHAUL ********************   SHI 567
          720   NUMNI=NUMNI-1                                                   SHI 568
565       730   MEAN=SHIP(J,9)                                                  SHI 569
                STANDV=SHIP(J,10)                                               SHI 570
          C     *************** GET DAYS SHIP WILL STAY IN OVERHAUL ************  SHI 571
                CALL NORMAL (DIST,MEAN,STANDV,RST)                              SHI 572
                HSHIP(J,3)=DIST+0.5                                             SHI 573
570             HSHIP(J,4)=12                                                   SHI 574
                HSHIP(J,5)=0                                                    SHI 575
                HSHIP(J,6)=3                                                    SHI 576
                NMIOVR=NMIOVR+1                                                 SHI 577
                HSHIP(J,2)=2                                                    SHI 578
575             IF (HSHIP(J,3).GE.NODAYS(J,3)) SHIP(J,20)=SHIP(J,20)+100        SHI 579
                GO TO 1170                                                      SHI 580
          740   IF (HSHIP(J,4).NE.8) GO TO 750                                  SHI 581
                NODAYS(J,2)=100                                                 SHI 582
                IF (KDAY.LE.3) GO TO 470                                        SHI 583
580             HSHIP(J,3)=7-KDAY                                               SHI 584
                GO TO 1170                                                      SHI 585
          C     ******************** SEARCH FOR TENDER AVAILABLE ***************  SHI 586
          750   DO 800 JX=1,K1                                                  SHI 587
                IF (HSHIP(JX,6).NE.6) GO TO 800                                 SHI 588
585       C     ********** TENDER IS IN PORT.  K IS THE TENDER NUMBER **********  SHI 589
                K=JX                                                            SHI 590
                N5=HSHIP(K,5)                                                   SHI 591
          C     ********** CHECK IF SHIP GOING TO TENDER IS PERMITTED TO *******  SHI 592
          C     ******************** NEST HERE *********************************  SHI 593
590       C     ********************* CHECK PRIORITY FIRST *********************  SHI 594
                DO 760 JY=6,9                                                   SHI 595
                IF (FRAME(N5,JY).EQ.SHIP(JZ1,20)) GO TO 770                     SHI 596
          760   CONTINUE                                                        SHI 597
                GO TO 800                                                       SHI 598
595       C     *************** CHECK IF NEST IS FILLED ************************  SHI 599
          770   IF (SHIP(K,16).GE.SHIP(JZ1,16)) GO TO 780                       SHI 600
                WRITE (6,1660) K,JZ1                                            SHI 601
                GO TO 800                                                       SHI 602
          780   IF (FRAME(N5,4).EQ.0.) GO TO 800                                SHI 603
600             IF (FRAME(N5,4).LE.FRAME(N5,16)) GO TO 790                      SHI 604
          C     ********** CHECK IF THE SIZE OF THE SHIP NEST IS GREATER THAN **  SHI 605
          C     ************** THE NUMBER ALREADY NESTED HERE ******************  SHI 606
                IF (SHIP(K,17).LE.FRAME(N5,16)) GO TO 790                       SHI 607
          C     ***************** CHECK IF C I AVAILABLE AT TENDER ***************SHI 608
605             IF (FRAME(N5,2)-FRAME(N5,11).LT.SHIP(JZ1,15)) GO TO 790         SHI 609
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                IF (FRAME(N5,3)-FRAME(N5,12).LT.SHIP(JZ1,14)) GO TO 790          SHI 610
                ITENDR=2                                                         SHI 611
                GO TO 810                                                        SHI 612
           790  ITENDR=1                                                         SHI 613
610        800  CONTINUE                                                         SHI 614
           810  IF (ITENDR.EQ.0) NODAYS(J,2)=100                                 SHI 615
                JX=K                                                             SHI 616
           C    ********************* CHECK IF SHIP IS IN PORT ******************SHI 617
                IF (HSHIP(J,2).EQ.2) GO TO 820                                   SHI 618
615             IF (ITENDR.EQ.1) GO TO 1170                                      SHI 619
                IF (KDAY.LE.7) GO TO 440                                         SHI 620
                HSHIP(J,3)=7-KDAY                                                SHI 621
                GO TO 1170                                                       SHI 622
           820  IF (ITENDR-1) 400,900,1000                                       SHI 623
620        C    ************** SHIP LEAVING WAS IN STREAM ********************  SHI 624
           830  STREAM(KZ,1)=0.                                                  SHI 625
                STREAM(KZ,2)=0.                                                  SHI 626
                GO TO 860                                                        SHI 627
           C    ****************** SHIP LEAVING WAS NESTED ********************  SHI 628
625        840  XFRAME=FRAME(N5,16)-1.                                           SHI 629
                NFR=N5-N2+1                                                      SHI 630
                DO 870 K=1,K1                                                    SHI 631
           C    ********** CHECK FOR SHIP NESTED TO ONE THAT IS LEAVING ********  SHI 632
                IF (HSHIP(K,5).NE.N5) GO TO 870                                  SHI 633
630        C    *************** CHECK IF THIS IS THE ONE LEAVING ***************  SHI 634
                IF (K.EQ.JZ1) GO TO 870                                          SHI 635
                IF (FRAME(NFR,16).NE.0.0.AND.SHIP(K,16).LT.SHIP(JZ1,16)) GO TO 870SHI 636
           C    ********** HAVE FOUND SHIP NESTED TO ONE THAT IS LEAVING *******  SHI 637
           C    ********************** N1 IS THE SHIP NUMBER **********************SHI 638
635             N1=K                                                             SHI 639
                IFI=1                                                            SHI 640
           C    ******************** CHANGE STATE TO THAT OF FIRESIDE **********  SHI 641
                IF (HSHIP(K,4).EQ.5) HSHIP(K,4)=1                                SHI 642
                IF (HSHIP(K,4).EQ.6) HSHIP(K,4)=3                                SHI 643
640             IF (HSHIP(K,4).EQ.7) HSHIP(K,4)=4                                SHI 644
           C    ********************** CHECK IF SHIP IS A TENDER ******************SHI 645
                IF (SHIP(K,4).GT.0.) HSHIP(K,6)=6                                SHI 646
           C    ***************** CHANGE NAME OF SHIP AT FIRESIDE AND ETC **********SHI 647
           C    ***************** OF SHIPS NESTED THERE ****************************SHI 648
645             DO 860 KZ=1,N2                                                   SHI 649
                IF (FRAME(N5,16).LE.0.0) GO TO 850                               SHI 650
                FRAME(N5,13)=N1                                                  SHI 651
                FRAME(N5,14)=SHIP(N1,2)                                          SHI 652
                FRAME(N5,15)=SHIP(N1,3)                                          SHI 653
650             FRAME(N5,16)=FRAME(N5,16)-1.                                     SHI 654
                GO TO 860                                                        SHI 655
           850  FRAME(N5,1)=1.                                                   SHI 656
                FRAME(N5,13)=0.                                                  SHI 657
                FRAME(N5,14)=BLANK                                               SHI 658
655             FRAME(N5,15)=0.                                                  SHI 659
           860  N5=N5-1                                                          SHI 660
                GO TO 840                                                        SHI 661
           870  CONTINUE                                                         SHI 662
                PRINT 1670, JZ1,(SHIP(JZ1,K),K=2,4)                              SHI 663
660             STOP 103                                                         SHI 664
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C     **************** SHIP GOES TO PCM IF IT HAS NOT ****************
C     **************** YET BEEN IN C I LONG ENOUGH *******************
C     **************** TO GO ON EXT OPS ******************************
880   HSHIP(J,3)=21
      SHIP(J,20)=SHIP(J,20)+200.
      NUMCI=NUMCI+1
C     **************** CHECK IF SHIP IS IN PORT ***********************
      IF (HSHIP(J,2).NE.1) GO TO 890
      IF (HSHIP(J,4).NE.0) GO TO 910
C     ********************* SHIP NEEDS PCM STATE ***********************
890   HSHIP(J,6)=5
900   M=M+1
      ARRV(M,1)=J
      ARRV(M,2)=SHIP(J,20)
      HSHIP(J,2)=1
      GO TO 1170
C     ********************* CHECK IF SHIP IS IN C I AT TENDER **********
910   IF (HSHIP(J,4).NE.8) GO TO 920
C     ********************* SHIP IS IN C I AT TENDER *****************
C     **************** CHECK IF DAYS TO GO IN THIS STATE ***************
C     **************** HAVE BEEN REACHED    ****************************
      IF (HSHIP(J,6).EQ.5) GO TO 940
C     ********************* SHIP REMAINS AT TENDER *********************
C     ************** ADJUST DAYS TO GO TO THOSE OF PCM *****************
      HSHIP(J,3)=21-SHIP(J,13)
      HSHIP(J,6)=5
      IF (HSHIP(J,3).GT.0) GO TO 1170
      SHIP(J,20)=SHIP(J,20)-100.
      GO TO 950
920   HSHIP(J,6)=5
      IF (HSHIP(J,4).EQ.11) GO TO 1170
      N2=SHIP(J,16)
      N5=HSHIP(J,5)
      DO 930 K=1,N2
      IF (FRAME(N5,2).LT.SHIP(J,15)) GO TO 440
      IF (FRAME(N5,3).LT.SHIP(J,14)) GO TO 440
930   N5=N5-1
      GO TO 1170
C     **************** SHIP IS READY TO LEAVE TENDER AND TO ************
C     **************** GO OUT ON EXT OPS ******************************
940   NUMCI=NUMCI-1
950   N5=HSHIP(J,5)
      N2=SHIP(J,16)
C     **************** CHECK TO SEE IF FRAME COUNTER HAS BEEN SET  *****
C     ****************************** CORRECTLY ************************
      IF (FRAME(N5,16).GE.1.) GO TO 960
      PRINT 1680, J,(SHIP(J,K),K=2,4),N5
      STOP 111
C     **************** ADJUST UTILITIES AT FRAMES WHERE SHIP WAS *******
C     **************** NESTED TO TENDER ***********************S *******
960   DO 970 K=1,N2
      FRAME(N5,11)=FRAME(N5,11)-SHIP(JZ1,15)
      FRAME(N5,12)=FRAME(N5,12)-SHIP(JZ1,14)
      FRAME(N5,16)=FRAME(N5,16)-1
970   N5=N5-1
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                SHIP(J,21)=0.                                                   SHI 720
                SHIP(J,22)=0.                                                   SHI 721
                HSHIP(J,5)=0                                                    SHI 722
          C     ********************** SHIP LEAVING FOR EXT OPS ******************SHI 723
720       980   NUMNI=NUMNI-1                                                   SHI 724
                NUMCI=NUMCI-1                                                   SHI 725
                HSHIP(J,4)=0                                                    SHI 726
          C     ***************** SHIP IS GOING OUT ON EXT OPS ******************* SHI 727
          C     ***************** GET DAYS SHIP HAS TO GO ON EXT OPS **************SHI 728
725       990   MEAN=SHIP(J,7)                                                  SHI 729
                STANDV=SHIP(J,8)                                                SHI 730
                CALL NORMAL (DIST,MEAN,STANDV,RST)                              SHI 731
                HSHIP(J,3)=DIST+0.5                                             SHI 732
                NUMEC=NUMEC+1                                                   SHI 733
730             HSHIP(J,2)=2                                                    SHI 734
                HSHIP(J,4)=0                                                    SHI 735
                HSHIP(J,6)=1                                                    SHI 736
                GO TO 1170                                                      SHI 737
          C     ********************** SHIP IS PLACED AT TENDER ******************SHI 738
735       1000  K=JX                                                            SHI 739
                N5=HSHIP(K,5)                                                   SHI 740
                N2=SHIP(J,16)                                                   SHI 741
                HSHIP(J,5)=N5                                                   SHI 742
                HSHIP(J,2)=1                                                    SHI 743
740             HSHIP(J,3)=SHIP(J,13)                                           SHI 744
                HSHIP(J,6)=2                                                    SHI 745
                HSHIP(J,4)=8                                                    SHI 746
          C     ***************** ADJUST UTILITIES AND NUMBER NESTED **************SHI 747
          C     ***************** AT THE FRAMES TENDER OCCUPIES ******************* SHI 748
745             DO 1010 L=1,N2                                                  SHI 749
                FRAME(N5,11)=FRAME(N5,11)+SHIP(JZ1,15)                          SHI 750
                FRAME(N5,12)=FRAME(N5,12)+SHIP(JZ1,14)                          SHI 751
                FRAME(N5,16)=FRAME(N5,16)+1.                                    SHI 752
          1010  N5=N5-1                                                        SHI 753
750       C     ***************** PUT UTILITIES IN SHIP MATRIX THAT SHIP IS *******SHI 754
          C     ***************** RECEIVING FROM TENDER *************************** SHI 755
                SHIP(J,21)=SHIP(J,15)                                           SHI 756
                SHIP(J,22)=SHIP(J,14)                                           SHI 757
                GO TO 1170                                                      SHI 758
755       C     ***************** SHIP CHANGING STATE WAS IN OVERHAUL *************SHI 759
          C     ***************** SET NUMBER OF DAYS UNTIL GOES AGAIN ***********  SHI 760
          C     *****************     TO OVERHALL ***********************************SHI 761
          1020  MEAN=SHIP(J,11)                                                 SHI 762
                STANDV=SHIP(J,12)                                               SHI 763
760             CALL NORMAL (DIST,MEAN,STANDV,RST)                              SHI 764
                NODAYS(J,1)=DIST+0.5                                            SHI 765
                NMIOVR=NMIOVR-1                                                 SHI 766
          C     ********************** CHECK IF TIME FOR EXT OPS ******************SHI 767
                IF (NODAYS(J,3).LE.0) GO TO 990                                 SHI 768
765       C     ***************** NOT TIME FOR EXT OPS SO SET DAYS ***************SHI 769
          C     ***************** TO GO UNTIL TIME FOR TENDER ********************SHI 770
                NODAYS(J,2)=100                                                 SHI 771
                HSHIP(J,6)=2                                                    SHI 772
                NUMNI=NUMNI+1                                                   SHI 773
770             IF (SHIP(J,4).GT.0.0) GO TO 550                                 SHI 774
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                YFL=RANF(RST)                                                   SHI 775
                IF (KDAY.GT.3) GO TO 1030                                       SHI 776
          C     ********** CHECK IF SHIP IS GOING OUT OR IN **********          SHI 777
          C     ********** NOR OPS STATE **********                            SHI 778
775             IF (YFL.GT.0.5) GO TO 570                                       SHI 779
          1030  ISHIP(J,2)=1                                                    SHI 780
                YFL=RANF(RST)                                                   SHI 781
                ISHIP(J,3)=4*YFL+7-KDAY                                         SHI 782
                M=M+1                                                           SHI 783
780             ARRV(M,1)=J                                                     SHI 784
                ARRV(M,2)=SHIP(J,20)                                            SHI 785
                GO TO 1170                                                      SHI 786
          C     ********** SHIP CHANGING STATE WAS AT PIERSIDE IN C I **********SHI 787
          1040  SHIP(J,20)=SHIP(J,20)-100.                                      SHI 788
785             NUMCI=NUMCI-1                                                   SHI 789
                N5=ISHIP(J,5)                                                   SHI 790
                N2=SHIP(J,16)                                                   SHI 791
          C     ********** CHECK IF TIME TO GO TO OVERHAUL **********           SHI 792
                IF (NDAYS(J,1).LE.0) GO TO 1060                                 SHI 793
790       C     ********** CHECK IF TIME TO GO NOR OPS **********               SHI 794
                IF (NDAYS(J,3).LE.0) GO TO 1070                                 SHI 795
                IF (SHIP(J,4).GT.0.) GO TO 680                                  SHI 796
          C     ********** SHIP AT PIERSIDE AND IN C I GOES ON NOR OPS *****    SHI 797
          C     ********** SET DAYS TO GO UNTIL TENDER **********               SHI 798
795             NDAYS(J,2)=100                                                  SHI 799
                ISHIP(J,6)=2                                                    SHI 800
          C     ********** CHECK IF SHIP IS GOING OUT OR IN ON NOR OPS *****    SHI 801
                YFL=RANF(RST)                                                   SHI 802
                IF (KDAY.GT.3) GO TO 1050                                       SHI 803
800             IF (YFL.GT.0.5) GO TO 440                                       SHI 804
          C     ********** SHIP WHICH WAS AT PIERSIDE IN C I IS STAYING ****    SHI 805
          C     ********** IN , ON NOR OPS **********                          SHI 806
          1050  YFL=RANF(RST)                                                   SHI 807
                ISHIP(J,3)=4*YFL+7-KDAY                                         SHI 808
805             GO TO 1170                                                      SHI 809
          C     ********** SHIP AT PIERSIDE IN C I GOING TO OVERHAUL *******    SHI 810
          1060  IOVR=1                                                          SHI 811
                GO TO 1090                                                      SHI 812
          C     ********** SHIP AT PIERSIDE IN C I GOING FOM **********        SHI 813
810       1070  IFOM=1                                                          SHI 814
                SHIP(J,20)=SHIP(J,20)+100.                                      SHI 815
                GO TO 1090                                                      SHI 816
          C     ********** SHIP CHANGING STATE WAS IN FOM **********           SHI 817
          1080  SHIP(J,20)=SHIP(J,20)-100.                                      SHI 818
815             N5=ISHIP(J,5)                                                   SHI 819
                IFOM=1                                                          SHI 820
          1090  IF (ISHIP(J,4).NE.1) GO TO 480                                  SHI 821
                GO TO 460                                                       SHI 822
          C     ********** SHIP CHANGING STATE WAS A TENDER **********          SHI 823
820       C     ********** SUPPLYING UTILITIES **********                       SHI 824
          1100  DO 1150 K=1,K1                                                  SHI 825
          C     ********** CHECK IF THIS IS A TENDER OF SAME CLASS *********   SHI 826
                IF (SHIP(K,4).NE.SHIP(JZ1,4)) GO TO 1140                        SHI 827
          C     ********** CHECK IF THIS IS THE TENDER CHANGING STATE *****    SHI 828
825             IF (K.EQ.JZ1) GO TO 1140                                        SHI 829
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      C     ********** CHECK IF THIS TENDER IS SUPPLYING UTIL. *********SHI 830
            IF (HSHIP(K,6).NE.6) GO TO 1110                             SHI 831
            ITEND=-1                                                    SHI 832
            GO TO 1140                                                  SHI 833
830   1110  IF (ITEND.LT.0) GO TO 1140                                   SHI 834
            IF (ITEND.GT.0) GO TO 1130                                  SHI 835
      1120  ITEND=HSHIP(K,3)+1                                          SHI 836
            GO TO 1140                                                  SHI 837
      1130  IF (ITEND.GT.HSHIP(K,3)) GO TO 1120                         SHI 838
835   C     ********** CHECK IF TENDER THAT IS CHANGING STATE **********SHI 839
      C     ********** IS NESTED ***************************************SHI 840
      1140  IF (HSHIP(K,5).NE.HSHIP(JZ1,5)) GO TO 1150                  SHI 841
      C     ********** CHECK IF THIS IS THE ONE THAT IS **************SHI 842
      C     ********** CHANGING STATE **********************************SHI 843
840         IF (K.EQ.JZ1) GO TO 1150                                    SHI 844
      C     ********** CHECK IF DAYS TO GO FOR SHIP NESTED ARE *********SHI 845
      C     ********** GREATER THAN THOSE OF TENDER ********************SHI 846
            IF (HSHIP(K,3).LE.HSHIP(JZ1,3)) GO TO 1150                  SHI 847
      C     ********** SET DAYS TO GO FOR TENDER TO THOSE OF ***********SHI 848
845   C     ********** SHIP IT IS NESTED WITH **************************SHI 849
            HSHIP(JZ1,3)=HSHIP(K,3)                                     SHI 850
      1150  CONTINUE                                                    SHI 851
      C     ********** CHECK IF TENDER CAN CHANGE STATE NOW ************SHI 852
            IF (ITEND.GT.0) GO TO 1160                                  SHI 853
850         HSHIP(J,6)=7                                                SHI 854
            IF (HSHIP(J,3).NE.0) GO TO 1170                             SHI 855
      C     ********** TENDER MAY CHANGE ITS STATE **********************SHI 856
            GO TO 650                                                   SHI 857
      C     ********************** TENDER STAYS IN *********************SHI 858
855   1160  HSHIP(J,3)=ITEND                                            SHI 859
      1170  CONTINUE                                                    SHI 860
      C     ALL SHIPS HAVE BEEN PROCESSED                               SHI 861
      C        SEARCH FOR SHIP BERTHED AT PIER BUT NOT                  SHI 862
      C        USING PIER UTILITIES AND EXPECTING TO STAY MORE          SHI 863
860   C        THAN 3 DAYS                                              SHI 864
            NFLAG=2                                                     SHI 865
      1180  NFLAG=NFLAG-1                                               SHI 866
      C     SELECT HIGH PRIORITY SHIPS FIRST                            SHI 867
            A=200.                                                      SHI 868
865         DO 1240 J=1,2                                               SHI 869
            A=A-100.                                                    SHI 870
            DO 1240 KG=1,K1                                             SHI 871
            IF (SHIP(KG,20).LT.A) GO TO 1240                            SHI 872
            IF (HSHIP(KG,4).LT.2) GO TO 1240                            SHI 873
870         IF (HSHIP(KG,4).GT.7.OR.HSHIP(KG,4).EQ.5) GO TO 1240        SHI 874
            IF (HSHIP(KG,3).LT.3) GO TO 1240                            SHI 875
            IF (HSHIP(KG,6).EQ.6) GO TO 1240                            SHI 876
            IF (SHIP(KG,4).GT.0.0.AND.A.LT.100) GO TO 1240              SHI 877
      C     ******SHIP MEETS CRITERIA SO SEARCH FOR UTILITIES **********SHI 878
875         N=KG                                                        SHI 879
            M6=0                                                        SHI 880
      C     GET LOCATION OF SHIP (HIGH FRAME)                           SHI 881
            NA=HSHIP(KG,5)                                              SHI 882
            NG=NA-SHIP(N,16)+1.                                         SHI 883
880   C     GET NECESSARY UTILITIES                                     SHI 884
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                ND=FRAME(NA,17)                                                 SHI 885
              C AS AND BA REPRESENT THE MAXIMUM AMOUNT OF STEAM AND AC PROVIDABLE SHI 886
                BA=SHIP(N,14)                                                   SHI 887
                AS=SHIP(N,15)                                                   SHI 888
    885         DO 1190 KH=NG,NA                                                SHI 889
              C C IS THE AMOUNT OF UTILITIES AVAILABLE                          SHI 890
                C=FRAME(KH,2)-FRAME(KH,11)                                      SHI 891
                IF (AS.GT.C) AS=C                                               SHI 892
                C=FRAME(KH,3)-FRAME(KH,12)                                      SHI 893
    890         IF (BA.GT.C) BA=C                                               SHI 894
   1190         CONTINUE                                                        SHI 895
              C AC AND ST REPRESENT THE NEED OF THE SHIP                        SHI 896
                AC=SHIP(N,14)-SHIP(N,22)                                        SHI 897
                ST=SHIP(N,15)-SHIP(N,21)                                        SHI 898
    895         C=PIER(ND,3)-PIER(ND,4)                                         SHI 899
                IF (BA.GT.C) BA=C                                               SHI 900
                C=PIER(ND,1)-PIER(ND,2)                                         SHI 901
                IF (AS.GT.C) AS=C                                               SHI 902
              C M6=1 MEANS THAT THE SHIP CAN BE PROVIDED FULL UTILITIES         SHI 903
    900         IF (AC.LE.BA.AND.ST.LE.AS) M6=1                                 SHI 904
                IF (AC.GT.BA) AC=BA                                             SHI 905
                IF (ST.GT.AS) ST=AS                                             SHI 906
                IF (ST+AC.LE.0.) GO TO 1230                                     SHI 907
              C IF UTILITIES ARE AVAILABLE, ADD THEM                            SHI 908
    905         DO 1200 KH=NG,NA                                                SHI 909
                FRAME(KH,11)=FRAME(KH,11)+ST                                    SHI 910
   1200         FRAME(KH,12)=FRAME(KH,12)+AC                                    SHI 911
                PIER(ND,2)=PIER(ND,2)+ST                                        SHI 912
                PIER(ND,4)=PIER(ND,4)+AC                                        SHI 913
    910         SHIP(N,21)=SHIP(N,21)+ST                                        SHI 914
                SHIP(N,22)=SHIP(N,22)+AC                                        SHI 915
              C CHANGE IN-PORT STATUS TO REFLECT UTILITIES ADDED                SHI 916
                IF (M6.EQ.1) GO TO 1210                                         SHI 917
                IF (HSHIP(KG,4).EQ.7) HSHIP(KG,4)=6                             SHI 918
    915         IF (HSHIP(KG,4).EQ.4) HSHIP(KG,4)=3                             SHI 919
                GO TO 1220                                                      SHI 920
   1210         IF (HSHIP(KG,4).GT.5) HSHIP(KG,4)=5                             SHI 921
                IF (HSHIP(KG,4).LT.5) HSHIP(KG,4)=1                             SHI 922
   1220         IF (IJGA.NE.1) GO TO 1230                                       SHI 923
    920         PRINT 1690, KG                                                  SHI 924
                IF (M6.NE.1) WRITE (6,1700)                                     SHI 925
   1230         IF (HSHIP(KG,6).EQ.4) HSHIP(KG,3)=30                            SHI 926
                IF (HSHIP(KG,6).EQ.5) HSHIP(KG,3)=21                            SHI 927
   1240         CONTINUE                                                        SHI 928
    925         IF (NFLAG.LE.0) GO TO 1330                                      SHI 929
                M1=M                                                            SHI 930
                M2=M51                                                          SHI 931
                IF (M2.EQ.0) GO TO 1270                                         SHI 932
                M21=M51                                                         SHI 933
    930         M51=0                                                           SHI 934
              C STORE OLD STREAM IN NEW STREAM                                  SHI 935
                DO 1250 J=1,M21                                                 SHI 936
                STREAM(J,1)=STREMN(J,1)                                         SHI 937
                STREAM(J,2)=STREMN(J,2)                                         SHI 938
    935         CONTINUE                                                        SHI 939
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                      DO 1260 J=1,M21                                          SHI 940
                C     PLACE PRIORITY SHIPS WAITING IN STREAM BEFORE PLACING NEW ARRIVALSSHI 941
                      IF (STREAM(J,2).LT.100.) GO TO 1260                      SHI 942
                      KM=STREAM(J,1)                                           SHI 943
    940               HSHIP(KM,3)=21                                           SHI 944
                      IF (STREAM(J,2).LT.200.) HSHIP(KM,3)=30                  SHI 945
                      STREAM(J,2)=0                                            SHI 946
                      N=HSHIP(KM,1)                                            SHI 947
                      IDAYS=HSHIP(KM,3)                                        SHI 948
    945               CALL PLACE (IJ9A)                                        SHI 949
                      HSHIP(KM,4)=G                                            SHI 950
                      HSHIP(KM,5)=HF                                           SHI 951
                1260  CONTINUE                                                 SHI 952
                1270  IF (M1.EQ.0) GO TO 1290                                  SHI 953
    950         C     PLACE PRIORITY NEW ARRIVALS BEFORE PLACING REMAINING IN STREAM SHI 954
                      DO 1280 J=1,M                                            SHI 955
                      IF (ARRV(J,2).LT.100.) GO TO 1280                        SHI 956
                      KM=ARRV(J,1)                                             SHI 957
                      HSHIP(KM,3)=21                                           SHI 958
    955               IF (ARRV(J,2).LT.200.) HSHIP(KM,3)=30                    SHI 959
                      ARRV(J,2)=0                                              SHI 960
                      N=HSHIP(KM,1)                                            SHI 961
                      IDAYS=HSHIP(KM,3)                                        SHI 962
                      CALL PLACE (IJ9A)                                        SHI 963
    960               HSHIP(KM,4)=G                                            SHI 964
                      HSHIP(KM,5)=HF                                           SHI 965
                1280  CONTINUE                                                 SHI 966
                1290  IF (M2.EQ.0) GO TO 1310                                  SHI 967
                C     PLACE REMAINING IN-STREAM SHIPS BEFORE PLACING REMAINING NEW ARRIVSHI 968
    965               DO 1300 J=1,M21                                          SHI 969
                      IF (STREAM(J,2).EQ.0.) GO TO 1300                        SHI 970
                      KM=STREAM(J,1)                                           SHI 971
                      N=HSHIP(KM,1)                                            SHI 972
                      IDAYS=HSHIP(KM,3)                                        SHI 973
    970               CALL PLACE (IJ9A)                                        SHI 974
                      HSHIP(KM,4)=G                                            SHI 975
                      HSHIP(KM,5)=HF                                           SHI 976
                1300  CONTINUE                                                 SHI 977
                C     FINALLY, PLACE REMAINING NEW ARRIVALS                    SHI 978
    975         1310  IF (M1.EQ.0) GO TO 1180                                  SHI 979
                      DO 1320 J=1,M                                            SHI 980
                      IF (ARRV(J,2).EQ.0.) GO TO 1320                          SHI 981
                      KM=ARRV(J,1)                                             SHI 982
                      N=HSHIP(KM,1)                                            SHI 983
    980               IDAYS=HSHIP(KM,3)                                        SHI 984
                      CALL PLACE (IJ9A)                                        SHI 985
                      HSHIP(KM,4)=G                                            SHI 986
                      HSHIP(KM,5)=HF                                           SHI 987
                1320  CONTINUE                                                 SHI 988
    985               GO TO 1180                                               SHI 989
                1330  CALL CIDSTA (IDSTAT)                                     SHI 990
                1340  CONTINUE                                                 SHI 991
                C     END OF QUARTER************************                   SHI 992
                      DO 1350 J=1,K1                                           SHI 993
    990               DO 1350 KM=1,14                                          SHI 994
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                1350  IOSTAT(J,KM,2)=IOSTAT(J,KM,2)+IOSTAT(J,KM,1)                    SHI 995
                      IF (IJ8.LE.0) GO TO 1360                                        SHI 996
                      CALL PRTQTR (NQ,IX,IPORT,IOSTAT)                                SHI 997
                C     CALCULATE TENDER CYCLE                                          SHI 998
 995            1360  DO 1390 J=1,K1                                                  SHI 999
                      IF (HSHIP(J,6).NE.2) GO TO 1370                                 SHI1000
                      IF (NODAYS(J,2).LE.0) GO TO 1370                                SHI1001
                      YFL=RANF(RST)                                                   SHI1002
                      NODAYS(J,2)=(91.*YFL)+1                                         SHI1003
1000            1370  DO 1380 KM=1,14                                                 SHI1004
                1380  IOSTAT(J,KM,1)=0                                                SHI1005
                1390  CONTINUE                                                        SHI1006
                1400  CONTINUE                                                        SHI1007
                      IF (IJ8.EQ.0) GO TO 1410                                        SHI1008
1005                  IX=IX+1                                                         SHI1009
                      CALL PRTQTR (NQ,IX,IPORT,IOSTAT)                                SHI1010
                1410  STOP 200                                                        SHI1011
                C                                                                     SHI1012
                1420  FORMAT (3I3,I2,I1,5I4,4I1,2A8,3I1)                              SHI1013
1010            1430  FORMAT (F3.0,A4,F2.0,F3.1,4(F4.0,F3.0,),3F4.0,F2.0,F1.0,5F4.0)  SHI1014
                1440  FORMAT (1H1,T48,* SHIPS  HOMEPORTED   *,2A8)                    SHI1015
                1450  FORMAT (1HO,T3,*SHIP NO.*,T12,*NAME*,T17,*SEQ.*,                SHI1016
                     1T22,*CLASS*,T29,*NOR - OPS*,T43,*EXT - OPS*,T58,                SHI1017
                     2*IN OVRHL*,T70,*BETWEEN OVRHL*,T85,*AT TCR*,T93,                SHI1018
1015                 3*A.C.*,T99,*STM*,T106,*FR*,T111,*NEST*,T117,*A.C.*,T123,*STM*,  SHI10185
                     4T129,                                                           SHI1019
                     5*PR*,/T31,*(DAYS)*,T45,*(DAYS)*,T59,*(DAYS)*,T73,               SHI10195
                     6*(DAYS)*,T84,*(DA/QTR)*,T93,*NEED*,T99,*NEED*,T105,             SHI1020
                     7*NEED*,T111,*MAX*,T17,*NO.*,T117,*FURN*,T123,*FURN*,/           SHI10205
1020                 8T29,*MEAN  S.D.*,T43,*MEAN  S.D.*,T57,*MEAN  S.D.*,             SHI1021
                     9T72,*MEAN   S.D.*)                                              SHI1022
                1460  FORMAT (T4,F5.0,T12,A4,T17,F3.0,T23,F3.1,T28,F6.0,1X,F5.0,T42,F6.0SHI1023
                     1,1X,F5.0,T56,F6.0,1X,F5.0,T70,F7.0,T78,F5.0,T85,F5.0,T92,F5.2,T99,SHI1024
                     2F4.0,T105,F3.0,T111,F3.0,T116,F5.2,T123,F4.0,T129,F3.0)         SHI1025
1025            1470  FORMAT (I3,F1.0,2(F3.0),3X,F1.0,5(F2.0),F1.0,3(F3.0),A4,3(F2.0))SHI1026
                1480  FORMAT (1H-,T15,*FRAME*,T47,*FRAME*,T88,*FRAME*)                SHI1027
                1490  FORMAT (I2,8(F3.0))                                             SHI1028
                1500  FORMAT (1H-,T15,*PIER*,T47,*PIER*,T88,*PIER*)                   SHI1029
                1510  FORMAT(* INADEQUATE UTILITIES FOR SHIP*I4)                      SHI1030
1030            1520 0 FORMAT(* NO BERTHING AVAILABLE FOR SHIP *I4)                    SHI1031
                1530  FORMAT (1HO,T15,*LEAVING THE ASSIGNMENT STAGE *)                SHI1032
                1540  FORMAT (1HO,T50,*LEAVING THE INITIALIZATION STAGE*)             SHI1033
                1550  FORMAT (1H+,T21,* CARDS ARE OUT OF ORDER.  *, T52,              SHI1034
                     1'       * NUMBER SHOULD = *,I4,T93,                            SHI10345
                     2           * CARD READ WAS *,I4)                               SHI1035
1035            1560  FORMAT(1H-,T5,*PORT CONTROL LOG FOR DAY*,I5,*  QUARTER*,I5,T55,2A8SHI1036
                     1/T10,*STATE*,T22,*NUMBER OF SHIPS*,/T6,*NORMAL CPS IN*,T30,I5,/T6,SHI1037
                     2*IN COLD IRON*,T30,I5,/T6,*NORMAL CPS OUT *,T30,I5,/T6,*IN OVERHAUSHI1038
                     3L*,T30,I5,/T6,*EXTENDED OPS*,T30,I5)                            SHI1039
1040            1570  FORMAT (1H-,T44,*6*)                                           SHI1040
                1580  FORMAT(1H+,T15,*ILLEGAL VALUE FOR HSHIP(*,I4,*, )   *,A4,*  *,F4.0SHI1041
                     1,*  CLASS *,F4.0)                                              SHI1042
                1590  FORMAT(1H-,T15,*SHIP *,I4,*   *,A4,*   *,F4.0,*  CLASS  *,F4.0,* SHI1043
                     1COMING IN ON WEEKLY CYCLE FOR*I4,*  DAYS.ERROR*)                SHI1044
1045            1600  FORMAT (1H-,T44,*4*)                                            SHI1045
```

```
      1610  FORMAT(1H-,T15,*SHIP *,I4,*   *,A4,*   *,F4.0,*  CLASS  *,F4.0,*  SHI1046
           1GOING OUT ON WEEKLY CYCLE FOR*I4,*  DAYS.ERROR*)                    SHI1047
      1620  FORMAT(1H-,T15,*SHIP *,I4,*   *,A4,*   *,F4.0,*  CLASS  *,F4.0,*  SHI1048
           1GOING OUT IS SUPPOSED TO BE IN STREAM.  HSHIP(J,4)= 11 AND M51 = *SHI10485
1050       2,I4)                                                               SHI1049
      1630  FORMAT(1H-,T15,*STREAM MATRIX IS TOO SHORT.  FIX DIMENSION OF STRESHI1050
           1AM AND STREMN MATRICES*)                                           SHI1051
      1640  FORMAT(1H-,T15,*SHIP *,I4,*   *,A4,*   *,F4.0,*  CLASS  *,F4.0,*  SHI1052
           1WHICH IS SUPPOSED TO BE IN STREAM, IS NOT THERE*)                  SHI1053
1055  1650  FORMAT(1H-,    *SHIP *,I4,*   *,A4,*   *,F4.0,*  CLASS  *,F4.0,*  SHI1054
           1HAS ILLEGAL STATE AT PIER.  PROGRAM BUG.  HSHIP VALUES ARE*,E15)   SHI1055
      1660  FORMAT(* WARNING-------TENDER *,I3,* TOO SMALL TO ACCOMODATE SHIP SHI1056
           1*,I3)                                                              SHI10565
      1670  FORMAT (1H-,T15,*SHIP*,I4,*   *,A4,*   *,F4.0,* CLASS  *,F4.0,    SHI1057
1060       1 * IS SUPPOSED TO BE NESTED.  PROGRAM CANNOT FIND THE*,            SHI10575
           2 * NESTED SHIP.  PROGRAM BUG.*)                                    SHI1058
      1680  FORMAT (1H-,T15,*SHIP *,I4,*   *,A4,*   *,F4.0,*  CLASS*,F4.0,    SHI1059
           1 *  SUPPOSED TO BE NESTED TO TENDER.  FRAME *,I4,                  SHI10595
           2  * DOES NOT SHOW A SHIP NESTED.  PGM BUG.*)                       SHI1060
1065  1690  FORMAT (1X,8H SHIP = I3,16H GIVEN UTILITIES)                       SHI10E1
      1700  FORMAT (1H+,28X,10HPARTIALLY )                                      SHI1062
            END                                                                 SHI10E3-
```

SYMBOLIC REFERENCE MAP

ENTRY POINTS
4052 SHIPIN

VARIABLES	SN	TYPE	RELOCATION					
10204	A	REAL			10247	AC	REAL	
10255	ARRV	REAL	ARRAY		10244	AS	REAL	
10243	BA	REAL			7466	BLANK	REAL	
10246	C	REAL			10164	CTRL	REAL	
10151	CTR1	INTEGER			10222	CAY	REAL	
10173	DIST	REAL			10201	CIST1	REAL	
7	FRAME	REAL	ARRAY	COM1	0	G	INTEGER	COM1
1	HF	INTEGER		COM1	13505	HSHIP	INTEGER ARRAY	COM1
10156	I	INTEGER			10163	IA	INTEGER	
2	ICAYS	INTEGER		COM1	10216	IDIS	INTEGER	
12061	IDSTAT	INTEGER	ARRAY		10161	IDYLST	INTEGER	
10162	IE	INTEGER			10214	IFI	INTEGER	
0	IJ1	INTEGER		COM2	1	IJ2	INTEGER	COM2
3	IJ3	INTEGER		COM2	4	IJ4	INTEGER	COM2
6	IJ6	INTEGER		COM2	7	IJ7	INTEGER	COM2
10	IJ8	INTEGER		COM2	11	IJ9	INTEGER	COM2
10203	IJ9A	INTEGER			10154	IOUT	INTEGER	
10220	ICVR	INTEGER			10212	IPOM	INTEGER	
23765	IPORT	INTEGER	ARRAY		10166	IQ	INTEGER	
10215	IT	INTEGER			10217	ITENO	INTEGER	
10211	ITENDR	INTEGER			10205	ITHDAY	INTEGER	
23767	IUNIT	INTEGER	ARRAY		10207	IX	INTEGER	
10210	IZ1	INTEGER			2	I2J	INTEGER	COM2
5	I4J	INTEGER		COM2	10157	J	INTEGER	
10230	JX	INTEGER			10231	JY	INTEGER	
10213	JZ1	INTEGER			10165	K	INTEGER	
10206	KDAY	INTEGER			10236	KG	INTEGER	
10245	KH	INTEGER			10254	KM	INTEGER	
10227	KZ	INTEGER			3	K1	INTEGER	COM1
4	K2	INTEGER		COM1	10160	K3	INTEGER	
10234	L	INTEGER			10167	M	INTEGER	
10221	MB	INTEGER			10176	MEAN	INTEGER	
10251	M1	INTEGER			10252	M2	INTEGER	
10253	M21	INTEGER			5	M51	INTEGER	COM1
10237	ME	INTEGER			6	N	INTEGER	COM1
10240	NA	INTEGER			10242	ND	INTEGER	
10235	NFLAG	INTEGER			10232	NFR	INTEGER	
10241	NG	INTEGER			10174	NMIOVR	INTEGER	
11157	NODAYS	INTEGER	ARRAY		12	NQ	INTEGER	COM2
10171	NUMCI	INTEGER			10155	NUMEO	INTEGER	
10170	NUMNI	INTEGER			10172	NUMNO	INTEGER	
10233	N1	INTEGER			10224	N2	INTEGER	
10223	N5	INTEGER			15311	PIER	REAL ARRAY	COM1
10175	PR	REAL			10153	RST	REAL	
15621	SHIP	REAL	ARRAY	COM1	10250	ST	REAL	
10177	STANDV	REAL			22231	STREAM	REAL ARRAY	
24165	STREMN	REAL	ARRAY	COM1	22471	TNUSTR	REAL ARRAY	
10152	U	INTEGER			10225	XFRAME	REAL	

VARIABLES SN TYPE RELOCATION

10202	YFL	REAL	10200	YFLP	REAL	
10226	ZJ	REAL				

FILE NAMES MODE

0	INPUT	FMT	2022	OUTPUT	FMT	0	TAPE5	2022	TAPE6 FMT

EXTERNALS	TYPE	ARGS		
CIOSTA		1	NORMAL	4
PLACE		1	PRTFR	3
PRTHS		3	PRTQTR	4
RANF	REAL	1	TPONTF	5

INLINE FUNCTIONS	TYPE	ARGS	
MOD	INTEGER	2	INTRIN

STATEMENT LABELS

0	10	0	20	0	30
4201	40	4246	50	4300	60
0	70	4320	80	4330	90
4343	100	4350	110	0	120
0	130	4415	140	4416	150
4531	160	4534	170	4544	180
4551	190	4561	200	4607	210
4612	220	4635	230	4657	240
4672	250	4707	260	4714	270
4717	280	4741	290	4774	300
5007	310	5040	320	5062	330
5073	340	5140	350	5174	360
5216	370	5240	380	5245	390
5263	400	5306	410	5317	420
5325	430	5331	440	5365	450
5371	460	5375	470	5401	480
0	490	5430	500	0	510
5457	520	5465	530	0	540
5501	550	5515	560	5550	570
5577	580	5621	590	5631	600
0	610	5663	620	5700	630
5702	640	5747	650	0	660
6004	670	6011	680	0	690
6032	700	0	710	6053	720
6055	730	6100	740	6113	750
0	760	6134	770	6150	780
6173	790	6174	800	6177	810
6220	820	6223	830	6226	840
6313	850	6317	860	6322	870
6344	880	6357	890	6361	900
6370	910	6410	920	0	930
6433	940	6435	950	6463	960
0	970	6501	980	6505	990
6522	1000	0	1010	6552	1020
6602	1030	6617	1040	6646	1050
6656	1060	6660	1070	6664	1080
6671	1090	6675	1100	6714	1110
6717	1120	6721	1130	6723	1140

STATEMENT LABELS

6733	1150		6745	1160		6747	1170				
6753	1180		0	1190		0	1200				
7134	1210		7146	1220		7164	1230				
7176	1240		0	1250		7244	1260				
7247	1270		7275	1280		7300	1290				
7321	1300		7324	1310		7345	1320				
7350	1330		0	1340		0	1350				
7371	1360		7406	1370		0	1380				
0	1390		0	1400		7424	1410				
7467	1420	FMT	7473	1430	FMT	7502	1440	FMT			
7507	1450	FMT	7560	1460	FMT	7603	1470	FMT			
7612	1480	FMT	7617	1490	FMT	7622	1500	FMT			
7627	1510	FMT	7634	1520	FMT	7641	1530	FMT			
7646	1540	FMT	7654	1550	FMT	7666	1560	FMT			
7715	1570	FMT	7720	1580	FMT	7731	1590	FMT			
7745	1600	FMT	7750	1610	FMT	7764	1620	FMT			
10002	1630	FMT	10014	1640	FMT	10030	1650	FMT			
10045	1660	FMT	10055	1670	FMT	10074	1680	FMT			
10113	1690	FMT	10120	1700	FMT						

COMMON BLOCKS LENGTH

COM1	10517
COM2	11

STATISTICS

PROGRAM LENGTH	17756B	8174
BUFFER LENGTH	4044B	2084
COMMON LENGTH	24440B	10528

```
      SUBROUTINE PLACE (IJOA)                                                PLA   1
      COMMON /COM1/ G,HF,IDAYS,K1,K2,M51,N,FRAME(350,17),HSHIP(150,6),FIPLA   2
     1ER(25,8),SHIP(150,22),STREMN(80,2)                                     PLA   3
      INTEGER HSHIP,G,HF                                                     PLA   4
    5 M6=0                                                                   PLA   5
      I1=0                                                                   PLA   6
      L1=0                                                                   PLA   7
      L2=0                                                                   PLA   8
      L3=0                                                                   PLA   9
   10 L4=0                                                                   PLA  10
      N31=0                                                                  PLA  11
      N32=0                                                                  PLA  12
      N33=0                                                                  PLA  13
      N34=0                                                                  PLA  14
   15 N35=0                                                                  PLA  15
      N36=0                                                                  PLA  16
      N37=0                                                                  PLA  17
      T1=AMOD(SHIP(N,20),100.)                                               PLA  18
      T2=SHIP(N,20)-T1                                                       PLA  19
   20 SHIP(N,20)=T1                                                          PLA  20
      IF (IDAYS.LE.2) M6=1                                                   PLA  21
      N2=SHIP(N,16)                                                          PLA  22
      IF (SHIP(N,20).EQ.15.) GO TO 470                                       PLA  23
      IF (SHIP(N,20).EQ.29.) GO TO 470                                       PLA  24
   25 IF (SHIP(N,20).EQ.30.) GO TO 470                                       PLA  25
      IF (SHIP(N,20).EQ.31.) GO TO 470                                       PLA  26
      IF (SHIP(N,20).EQ.36.) GO TO 470                                       PLA  27
      IF (SHIP(N,20).EQ.37.) GO TO 470                                       PLA  28
      IF (SHIP(N,20).EQ.38.) GO TO 470                                       PLA  29
   30 IF (SHIP(N,20).EQ.39.) GO TO 470                                       PLA  30
   10 DO 230 JI=1,K2                                                         PLA  31
      J5=JI                                                                  PLA  32
      IF (FRAME(J5,1).GT.1.) GO TO 200                                       PLA  33
   20 IF (SHIP(N,20).EQ.FRAME(J5,5)) GO TO 30                                PLA  34
   35 IF (SHIP(N,20).EQ.FRAME(J5,6)) GO TO 80                                PLA  35
      IF (SHIP(N,20).EQ.FRAME(J5,7)) GO TO 80                                PLA  36
      IF (SHIP(N,20).EQ.FRAME(J5,8)) GO TO 80                                PLA  37
      IF (SHIP(N,20).EQ.FRAME(J5,9)) GO TO 80                                PLA  38
      GO TO 220                                                              PLA  39
   40 30 IF (I1.EQ.0) GO TO 90                                               PLA  40
      IF (FRAME(J5,10).EQ.1.) GO TO 100                                      PLA  41
   40 I1=I1+1                                                                PLA  42
      IF (I1.NE.N2) GO TO 230                                                PLA  43
      N5=J5                                                                  PLA  44
   45 IF (SHIP(N,4).GT.0.5.AND.T2.EQ.0.) GO TO 120                           PLA  45
      I2=FRAME(N5,17)                                                        PLA  46
      DO 50 J6=1,N2                                                          PLA  47
      A=FRAME(N5,2)-FRAME(N5,11)                                             PLA  48
      IF (A.LT.SHIP(N,15)) M6=1                                              PLA  49
   50 B=FIER(I2,2)+SHIP(N,15)                                                PLA  50
      IF (B.GT.FIER(I2,1)) M6=1                                              PLA  51
      A=FRAME(N5,3)-FRAME(N5,12)                                             PLA  52
      IF (A.LT.SHIP(N,14)) M6=1                                              PLA  53
      B=FIER(I2,4)+SHIP(N,14)                                                PLA  54
   55 IF (B.GT.FIER(I2,3)) M6=1                                              PLA  55
```

```
      N5=N5-1
   50 CONTINUE
      IF (M6.EQ.1) GO TO 110
      HF=J5
      G=1.
      IF (IJ9A.NE.1) GO TO 60
      WRITE (6,890) (SHIP(N,J),J=2,4),J5,IDAYS
      WRITE (6,910)
   60 DO 70 J8=1,N2
      FRAME(J5,1)=2.
      FRAME(J5,11)=FRAME(J5,11)+SHIF(N,15)
      FRAME(J5,12)=FRAME(J5,12)+SHIF(N,14)
      FRAME(J5,13)=SHIP(N,1)
      FRAME(J5,14)=SHIP(N,2)
      FRAME(J5,15)=SHIP(N,3)
      J5=J5-1
   70 CONTINUE
      PIER(I2,2)=PIER(I2,2)+SHIP(N,15)
      PIER(I2,4)=PIER(I2,4)+SHIP(N,14)
      IF (SHIP(N,4).GT.0.5) GO TO 170
      GO TO 870
   80 IF (L1.NE.1) GO TO 230
      IF (L4.NE.1) GO TO 230
      GO TO 30
   90 IF (FRAME(J5,10).EQ.2.) GO TO 100
      GO TO 40
  100 I1=0
      GO TO 40
  110 IF (IDAYS.LE.2) GO TO 120
      IF (L1.NE.1) GO TO 220
      IF (SHIP(N,20).EQ.FRAME(J5,5)) GO TO 120
      IF (L2.NE.1) GO TO 220
  120 IF (T2.LE.0.0) GO TO 140
      J8=J5-N2+1
      DO 130 J6=J8,J5
      IF (FRAME(J6,3).LT.SHIP(N,14)) GO TO 220
      IF (FRAME(J6,2).LT.SHIF(N,15)) GO TO 220
  130 CONTINUE
  140 HF=J5
      G=4.
      IF (IJ9A.NE.1) GO TO 150
      WRITE (6,890) (SHIP(N,J),J=2,4),J5,IDAYS
      WRITE (6,920)
  150 DO 160 J8=1,N2
      FRAME(J5,1)=2.
      FRAME(J5,13)=SHIP(N,1)
      FRAME(J5,14)=SHIP(N,2)
      FRAME(J5,15)=SHIP(N,3)
      J5=J5-1
  160 CONTINUE
      IF (SHIP(N,4).LT.0.5) GO TO 870
  170 DO 180 J8=1,K2
      IF (FRAME(J8,1).NE.4.0) GO TO 180
      FRAME(J8,1)=2.0
      IF (FRAME(J8,13).EQ.0.0) FRAME(J8,1)=1.0
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                180   CONTINUE                                                  PLA 111
                      IF (T2.GE.100.) GO TO 870                                 PLA 112
                      HSHIP(N,6)=6                                              PLA 113
                      J5=HF                                                     PLA 114
115                   DO 190 J8=1,N2                                            PLA 115
                      FRAME(J5,1)=3.                                            PLA 116
                      FRAME(J5,2)=SHIP(N,19)                                    PLA 117
                      FRAME(J5,3)=SHIP(N,18)                                    PLA 118
                190   J5=J5-1                                                   PLA 119
120                   GO TO 870                                                 PLA 120
                C     ***FRAME(X,1) = 4 IS RESERVED FOR TENDER  ***************** PLA 121
                200   IF (SHIP(N,4).LT.0.5) GO TO 220                           PLA 122
                      IF (FRAME(J5,1).NE.4.0) GO TO 220                         PLA 123
                      M31=J5-SHIP(N,16)+1                                       PLA 124
125                   IF (M31.LE.0) GO TO 220                                   PLA 125
                      DO 210 JLR=M31,J5                                         PLA 126
                      IF (FRAME(JLR,13).NE.0.0) GO TO 220                       PLA 127
                210   CONTINUE                                                  PLA 128
                      GO TO 20                                                  PLA 129
130             220   I1=0                                                      PLA 130
                      IF (IDAYS.GT.2) M6=0                                      PLA 131
                230   CONTINUE                                                  PLA 132
                      IF (L1.NE.1) GO TO 430                                    PLA 133
                      IF (L4.NE.1) GO TO 460                                    PLA 134
135                   IF (L2.NE.1) GO TO 440                                    PLA 135
                      IF (L3.NE.1) GO TO 450                                    PLA 136
                      IF (SHIP(N,17).EQ.0.) GO TO 400                           PLA 137
                240   DO 390 JK=1,K2                                            PLA 138
                      J8=JK                                                     PLA 139
140                   IF (FRAME(J8,1).NE.2.) GO TO 390                          PLA 140
                      IF (FRAME(J8,4).LT.1.) GO TO 390                          PLA 141
                      A=FRAME(J8,16)+1.                                         PLA 142
                      IF (A.GT.FRAME(J8,4)) GO TO 380                           PLA 143
                      J9=FRAME(J8,13)                                           PLA 144
145                   IF (J9.EQ.0) GO TO 390                                    PLA 145
                      J7=HSHIP(J9,1)                                            PLA 146
                      IF (SHIP(N,16).GT.SHIP(J7,16)) GO TO 380                  PLA 147
                      IF (SHIP(N,20).NE.FRAME(J5,5)) GO TO 300                  PLA 148
                250   I1=I1+1                                                   PLA 149
150                   IF (I1.NE.N2) GO TO 370                                   PLA 150
                      CC=J8                                                     PLA 151
                      IF (CC.NE.HSHIP(J9,5)) GO TO 290                          PLA 152
                      IF (SHIP(N,4).GT.0.5.AND.T2.EQ.0.0) GO TO 320             PLA 153
                      I2=FRAME(J8,17)                                           PLA 154
155                   N5=J8                                                     PLA 155
                      DO 260 KT=1,N2                                            PLA 156
                      A=FRAME(N5,2)-FRAME(N5,11)                                PLA 157
                      IF (A.LT.SHIP(N,15)) M6=1                                 PLA 158
                      B=PIER(I2,2)+SHIP(N,15)                                   PLA 159
160                   IF (B.GT.PIER(I2,1)) M6=1                                 PLA 160
                      A=FRAME(N5,3)-FRAME(N5,12)                                PLA 161
                      IF (A.LT.SHIP(N,14)) M6=1                                 PLA 162
                      B=PIER(I2,4)+SHIP(N,14)                                   PLA 163
                      IF (B.GT.PIER(I2,3)) M6=1                                 PLA 164
165                   N5=N5-1                                                   PLA 165
```

```
  260 CONTINUE
      IF (M6.EQ.1) GO TO 310
      HF=J8
      G=5.
      IF (IJ9A.NE.1) GO TO 270
      WRITE (6,900) (SHIP(N,J),J=2,4),J8,IDAYS
      WRITE (6,910)
  270 DO 280 JI=1,N2
      FRAME(J8,11)=FRAME(J8,11)+SHIP(N,15)
      FRAME(J8,12)=FRAME(J8,12)+SHIP(N,14)
      FRAME(J8,16)=FRAME(J8,16)+1.
      IF (SHIP(N,4).GT.0.5) FRAME(J8,1)=3.
      J8=J8-1
  280 CONTINUE
      PIER(I2,2)=PIER(I2,2)+SHIP(N,15)
      PIER(I2,4)=PIER(I2,4)+SHIP(N,14)
      GO TO 870
  290 I1=I1-1
      GO TO 370
  300 IF (SHIP(N,20).EQ.FRAME(J8,6)) GO TO 250
      IF (SHIP(N,20).EQ.FRAME(J8,7)) GO TO 250
      IF (SHIP(N,20).EQ.FRAME(J8,8)) GO TO 250
      IF (SHIP(N,20).EQ.FRAME(J8,9)) GO TO 250
      GO TO 380
  310 IF (IDAYS.LE.2) GO TO 320
      IF (L6.EQ.1) GO TO 320
      I1=0
      IF (IDAYS.GT.2) M6=0
      GO TO 390
  320 IF (T2.LE.0.0) GO TO 340
      J5=J8-N2+1
      DO 330 J6=J5,J8
      IF (FRAME(J6,3).LT.SHIP(N,14)) GO TO 380
      IF (FRAME(J6,2).LT.SHIP(N,15)) GO TO 380
  330 CONTINUE
  340 HF=J8
      IF (IJ9A.NE.1) GO TO 350
      WRITE (6,900) (SHIP(N,J),J=2,4),J8,IDAYS
      WRITE (6,920)
  350 G=7.
      DO 360 JI=1,N2
      FRAME(J8,16)=FRAME(J8,16)+1.
      IF (SHIP(N,4).GT.0.5) FRAME(J8,1)=3.
      J8=J8-1
  360 CONTINUE
      GO TO 870
  370 IF (FRAME(J8,10).NE.2.) GO TO 390
  380 I1=0
  390 CONTINUE
      IF (L6.EQ.1) GO TO 400
      L6=1
      GO TO 240
  400 IF (IJ9A.NE.1) GO TO 410
      WRITE (6,880) (SHIP(N,J),J=2,4)
  410 M51=M51+1
```

```
                STREAM(M51,1)=N                                                  PLA 221
                STREAM(M51,2)=SHIP(N,20)+T2                                      PLA 222
                G=11.                                                            PLA 223
                HF=0.                                                            PLA 224
225             IF (SHIP(N,4).LT.0.5) GO TO 870                                  PLA 225
                DO 420 IX=1,K2                                                   PLA 226
                IF (SHIP(N,20).EQ.FRAME(IX,5).AND.FRAME(IX,1).NE.3.0) FRAME(IX,1)=PLA 227
               14.0                                                              PLA 228
            420 CONTINUE                                                         PLA 229
230             IF (HSHIP(N,6).EQ.6) HSHIF(N,6)=2                                PLA 230
                GO TO 870                                                        PLA 231
            430 I1=0                                                             PLA 232
                IF (IDAYS.GT.2) M6=0                                             PLA 233
                L1=1                                                             PLA 234
235             GO TO 10                                                         PLA 235
            440 I1=0                                                             PLA 236
                IF (IDAYS.GT.2) M6=0                                             PLA 237
                L2=1                                                             PLA 238
                GO TO 10                                                         PLA 239
240         450 I1=0                                                             PLA 240
                IF (IDAYS.GT.2) M6=0                                             PLA 241
                L3=1                                                             PLA 242
                GO TO 10                                                         PLA 243
            460 L4=1                                                             PLA 244
245             IF (IDAYS.GT.2) M6=0                                             PLA 245
                GO TO 10                                                         PLA 246
            470 DO 620 J8=1,K2                                                   PLA 247
                IF (FRAME(J8,1).NE.1.) GO TO 610                                 PLA 248
                IF (N31.EQ.1) GO TO 580                                          PLA 249
250         480 IF (SHIP(N,20).NE.FRAME(J8,5)) GO TO 610                         PLA 250
                I1=I1+1                                                          PLA 251
                IF (I1.NE.N2) GO TO 600                                          PLA 252
                IF (IDAYS.LT.3) GO TO 530                                        PLA 253
                IF (N31.EQ.1) GO TO 530                                          PLA 254
255         490 N5=J8                                                            PLA 255
                I2=FRAME(N5,17)                                                  PLA 256
                DO 500 N3=1,N2                                                   PLA 257
                A=FRAME(N5,11)+SHIP(N,15)                                        PLA 258
                IF (A.GT.FRAME(N5,2)) M6=1                                       PLA 259
260             A=FRAME(N5,12)+SHIP(N,14)                                        PLA 260
                IF (A.GT.FRAME(N5,3)) M6=1                                       PLA 261
                N5=N5-1                                                          PLA 262
            500 CONTINUE                                                         PLA 263
                A=PIER(I2,2)+SHIP(N,15)                                          PLA 264
265             IF (A.GT.PIER(I2,1)) M6=1                                        PLA 265
                A=PIER(I2,4)+SHIF(N,14)                                          PLA 266
                IF (A.GT.PIER(I2,3)) M6=1                                        PLA 267
                IF (M6.NE.0) GO TO 610                                           PLA 268
                HF=J8                                                            PLA 269
270             IF (IJ9A.NE.1) GO TO 510                                         PLA 270
                WRITE (6,890) (SHIP(N,J),J=2,4),J8,IDAYS                         PLA 271
                WRITE (6,910)                                                    PLA 272
            510 G=1.                                                             PLA 273
                PIER(I2,2)=PIER(I2,2)+SHIF(N,15)                                 PLA 274
275             FIER(I2,4)=PIER(I2,4)+SHIP(N,14)                                 PLA 275
```

```
                N5=J8                                                          PLA 276
                DO 520 N3=1,N2                                                 PLA 277
                FRAME(N5,11)=FRAME(N5,11)+SHIP(N,15)                           PLA 278
                FRAME(N5,12)=FRAME(N5,12)+SHIP(N,16)                           PLA 279
280             FRAME(N5,1)=2.                                                 PLA 280
                IF (SHIP(N,4).GT.0.5) FRAME(N5,1)=3.                           PLA 281
                IF (SHIP(N,4).GT.0.5.AND.T2.LT.1E-20) HSHIF(N,6)=6             PLA 282
                FRAME(N5,13)=SHIP(N,1)                                         PLA 283
                FRAME(N5,14)=SHIP(N,2)                                         PLA 284
285             FRAME(N5,15)=SHIP(N,3)                                         PLA 285
                N5=N5-1                                                        PLA 286
          520   CONTINUE                                                       PLA 287
                GO TO 870                                                      PLA 288
          530   IF (T2.LE.0.8) GO TO 550                                       PLA 289
290             J5=J8-N2+1                                                     PLA 290
                DO 540 J6=J5,J8                                                PLA 291
                IF (FRAME(J6,3).LT.SHIP(N,14)) GO TO 610                       PLA 292
                IF (FRAME(J6,2).LT.SHIP(N,15)) GO TO 610                       PLA 293
          540   CONTINUE                                                       PLA 294
295       550   HF=J8                                                          PLA 295
                G=4.                                                           PLA 296
                IF (IJ9A.NE.1) GO TO 560                                       PLA 297
                WRITE (6,890) (SHIP(N,J),J=2,4),J8,IDAYS                       PLA 298
                WRITE (6,920)                                                  PLA 299
300       560   N5=J8                                                          PLA 300
                DO 570 N3=1,N2                                                 PLA 301
                FRAME(N5,1)=2.                                                 PLA 302
                IF (SHIP(N,4).GT.0.5) FRAME(N5,1)=3.                           PLA 303
                IF (SHIP(N,4).GT.0.5.AND.T2.LT.1E-20) HSHIF(N,6)=6             PLA 304
305             FRAME(N5,13)=SHIP(N,1)                                         PLA 305
                FRAME(N5,14)=SHIP(N,2)                                         PLA 306
                FRAME(N5,15)=SHIP(N,3)                                         PLA 307
                N5=N5-1                                                        PLA 308
          570   CONTINUE                                                       PLA 309
310             GO TO 870                                                      PLA 310
          580   IF (N33.NE.1) GO TO 590                                        PLA 311
                IF (N35.NE.1) GO TO 480                                        PLA 312
          590   IF (SHIP(N,20).NE.FRAME(J8,6)) GO TO 610                       PLA 313
                I1=I1+1                                                        PLA 314
315             IF (I1.NE.N2) GO TO 600                                        PLA 315
                IF (IDAYS.LT.3) GO TO 530                                      PLA 316
                IF (N33.EQ.1) GO TO 530                                        PLA 317
                GO TO 490                                                      PLA 318
          600   IF (FRAME(J8,10).NE.2.) GO TO 620                              PLA 319
320       610   I1=0                                                           PLA 320
                IF (IDAYS.GT.2) M6=0                                           PLA 321
          620   CONTINUE                                                       PLA 322
                I1=0                                                           PLA 323
                IF (N31.NE.1) GO TO 810                                        PLA 324
325             IF (N33.NE.1) GO TO 820                                        PLA 325
                IF (N35.NE.1) GO TO 830                                        PLA 326
                N37=1                                                          PLA 327
          630   DO 800 J8=1,K2                                                 PLA 328
                IF (FRAME(J8,1).NE.2.) GO TO 790                               PLA 329
330             IF (FRAME(J8,4).EQ.0.) GO TO 790                               PLA 330
```

```
      IF (FRAME(J8,16).EQ.FRAME(J8,4)) GO TO 790                        PLA 331
      IF (N32.EQ.1) GO TO 750                                           PLA 332
  640 IF (SHIP(N,20).NE.FRAME(J8,5)) GO TO 790                          PLA 333
      I1=I1+1                                                           PLA 334
  335 IF (I1.NE.N2) GO TO 780                                           PLA 335
      N5=FRAME(J8,13)                                                   PLA 336
      IF (FRAME(J8,13).EQ.0.) GO TO 790                                 PLA 337
      N6=HSHIP(N5,1)                                                    PLA 338
      IF (SHIP(N6,16).LT.SHIP(N,16)) GO TO 790                          PLA 339
  340 J9=HSHIP(N5,5)                                                    PLA 340
      IF (J8.EQ.J9) GO TO 650                                           PLA 341
      I1=I1-1                                                           PLA 342
      GO TO 800                                                         PLA 343
  650 IF (IDAYS.LT.3) GO TO 700                                         PLA 344
  345 IF (N32.EQ.1) GO TO 700                                           PLA 345
  660 N5=J8                                                             PLA 346
      I2=FRAME(N5,17)                                                   PLA 347
      DO 670 N3=1,N2                                                    PLA 348
      A=FRAME(N5,11)+SHIP(N,15)                                         PLA 349
  350 IF (A.GT.FRAME(N5,2)) M6=1                                        PLA 350
      A=FRAME(N5,12)+SHIP(N,14)                                         PLA 351
      IF (A.GT.FRAME(N5,3)) M6=1                                        PLA 352
      N5=N5-1                                                           PLA 353
  670 CONTINUE                                                          PLA 354
  355 A=PIER(I2,2)+SHIP(N,15)                                           PLA 355
      IF (A.GT.PIER(I2,1)) M6=1                                         PLA 356
      A=PIER(I2,4)+SHIP(N,14)                                           PLA 357
      IF (A.GT.PIER(I2,3)) M6=1                                         PLA 358
      IF (M6.NE.0) GO TO 790                                            PLA 359
  360 HF=J8                                                             PLA 360
      G=5.                                                              PLA 361
      IF (IJ9A.NE.1) GO TO 680                                          PLA 362
      WRITE (6,900) (SHIP(N,J),J=2,4),J8,IDAYS                          PLA 363
      WRITE (6,910)                                                     PLA 364
  365 680 PIER(I2,2)=PIER(I2,2)+SHIP(N,15)                              PLA 365
      PIER(I2,4)=PIER(I2,4)+SHIP(N,14)                                  PLA 366
      N5=J8                                                             PLA 367
      DO 690 N3=1,N2                                                    PLA 368
      FRAME(N5,11)=FRAME(N5,11)+SHIP(N,15)                              PLA 369
  370 FRAME(N5,12)=FRAME(N5,12)+SHIP(N,14)                              PLA 370
      FRAME(N5,16)=FRAME(N5,16)+1.                                      PLA 371
      IF (SHIP(N,4).GT.0.5) FRAME(N5,1)=3.                              PLA 372
      N5=N5-1                                                           PLA 373
  690 CONTINUE                                                          PLA 374
  375 GO TO 870                                                         PLA 375
  700 IF (T2.LE.0.0) GO TO 720                                          PLA 376
      J5=J8-N2+1                                                        PLA 377
      DO 710 J6=J5,J8                                                   PLA 378
      IF (FRAME(J6,3).LT.SHIP(N,14)) GO TO 790                          PLA 379
  380 IF (FRAME(J6,2).LT.SHIP(N,15)) GO TO 790                          PLA 380
  710 CONTINUE                                                          PLA 381
  720 HF=J8                                                             PLA 382
      G=7.                                                              PLA 383
      IF (IJ9A.NE.1) GO TO 730                                          PLA 384
  385 WRITE (6,900) (SHIP(N,J),J=2,4),J8,IDAYS                          PLA 385
```

```
                WRITE (6,920)                                                   PLA 386
          730   N5=J8                                                           PLA 387
                DO 740 N3=1,N2                                                  PLA 388
                FRAME(N5,16)=FRAME(N5,16)+1.                                    PLA 389
390             IF (SHIP(N,4).GT.0.5) FRAME(N5,1)=3.                            PLA 390
                N5=N5-1                                                         PLA 391
          740   CONTINUE                                                        PLA 392
                GO TO 870                                                       PLA 393
          750   IF (N34.NE.1) GO TO 760                                         PLA 394
395             IF (N36.NE.1) GO TO 640                                         PLA 395
          760   IF (SHIP(N,20).NE.FRAME(J8,6)) GO TO 790                        PLA 396
                I1=I1+1                                                         PLA 397
                IF (I1.NE.N2) GO TO 780                                         PLA 398
                N5=FRAME(J8,13)                                                 PLA 399
400             IF (FRAME(J8,13).EQ.0.) GO TO 790                               PLA 400
                N6=HSHIP(N5,1)                                                  PLA 401
                IF (SHIP(N6,16).LT.SHIP(N,16)) GO TO 790                        PLA 402
                N6=HSHIP(N5,5)                                                  PLA 403
                IF (J8.EQ.N6) GO TO 770                                         PLA 404
405             I1=I1-1                                                         PLA 405
                GO TO 800                                                       PLA 406
          770   IF (IDAYS.LT.3) GO TO 700                                       PLA 407
                IF (N34.EQ.1) GO TO 700                                         PLA 408
                GO TO 660                                                       PLA 409
410       780   IF (FRAME(J8,10).NE.2.) GO TO 800                               PLA 410
          790   I1=0                                                            PLA 411
          800   CONTINUE                                                        PLA 412
                IF (N32.NE.1) GO TO 840                                         PLA 413
                IF (N34.NE.1) GO TO 850                                         PLA 414
415             IF (N36.NE.1) GO TO 860                                         PLA 415
                IF (IDAYS.GT.2) M6=0                                            PLA 416
                GO TO 10                                                        PLA 417
          810   N31=1                                                           PLA 418
                GO TO 630                                                       PLA 419
420       820   N33=1                                                           PLA 420
                IF (IDAYS.GT.2) M6=0                                            PLA 421
                GO TO 630                                                       PLA 422
          830   N35=1                                                           PLA 423
                IF (IDAYS.GT.2) M6=0                                            PLA 424
425             GO TO 630                                                       PLA 425
          840   N32=1                                                           PLA 426
                IF (IDAYS.GT.2) M6=0                                            PLA 427
                GO TO 470                                                       PLA 428
          850   N34=1                                                           PLA 429
430             IF (IDAYS.GT.2) M6=0                                            PLA 430
                GO TO 470                                                       PLA 431
          860   N36=1                                                           PLA 432
                IF (IDAYS.GT.2) M6=0                                            PLA 433
                GO TO 470                                                       PLA 434
435       870   SHIP(N,20)=SHIP(N,20)+T2                                        PLA 435
                RETURN                                                          PLA 436
                C                                                               PLA 437
          880   FORMAT (1X,11H SHIP NAME ,A4,9H SEC.NO. ,F3.0,9H CLASS = ,F3.0,10HPLA 438
               1 IN STREAM)                                                     PLA 439
440       890   FORMAT (1X,11H SHIP NAME ,A4,9H SEC.NO. ,F3.0,9H CLASS = ,F3.0,15HPLA 440
```

```
      1 IS IN FRAME = ,I7,5H FOR ,I3,5H DAYS)                                  PLA 441
900    FORMAT (1X,11H SHIP NAME ,A4,9H SEC.NO. ,F3.0,9H CLASS = ,F3.0,22HPLA 442
      1 IS NESTED IN FRAME = ,I7,5H FOR ,I3,5H DAYS)                           PLA 443
910    FORMAT (1X,14H HAS UTILITIES)                                           PLA 444
445    920    FORMAT (1X,24H DOES NOT HAVE UTILITIES)                          PLA 445
       END                                                                     PLA 44E-
```

SYMBOLIC REFERENCE MAP

ENTRY POINTS
2 PLACE

VARIABLES	SN	TYPE		RELOCATION
2154	A	REAL		
2155	CC	REAL		
0	G	INTEGER		COM1
13505	HSHIP	INTEGER	ARRAY	COM1
0	IJ9A	INTEGER		F.P.
2130	I1	INTEGER		
2156	J	INTEGER		
2162	JK	INTEGER		
2150	J5	INTEGER		
21E4	J7	INTEGER		
2163	J9	INTEGER		
3	K1	INTEGER		COM1
2131	L1	INTEGER		
2133	L3	INTEGER		
2167	L6	INTEGER		
5	M51	INTEGER		COM1
6	N	INTEGER		COM1
2171	N3	INTEGER		
2136	N32	INTEGER		
2140	N34	INTEGER		
2142	N36	INTEGER		
2151	N5	INTEGER		
15311	PIER	REAL	ARRAY	COM1
24165	STREMN	REAL	ARRAY	COM1
2145	T2	REAL		
2155	P	REAL		
7	FRAME	REAL	ARRAY	CCM1
1	HF	INTEGER		CCM1
2	IDAYS	INTEGER		CCM1
2170	IX	INTEGER		
2152	I2	INTEGER		
2147	JI	INTEGER		
2161	JLR	INTEGER		
2153	J6	INTEGER		
2157	J8	INTEGER		
216E	KT	INTEGER		
4	K2	INTEGER		CCM1
2132	L2	INTEGER		
2134	L4	INTEGER		
2160	M31	INTEGER		
2127	M6	INTEGER		
214E	N2	INTEGER		
2135	N31	INTEGER		
2137	N33	INTEGER		
2141	N35	INTEGER		
2143	N37	INTEGER		
2172	N6	INTEGER		
15E21	SHIP	REAL	ARRAY	CCM1
2144	T1	REAL		

FILE NAMES MODE
TAPE6 FMT

INLINE FUNCTIONS TYPE ARGS
AMOD REAL 2 INTRIN

STATEMENT LABELS

71	10	76	20	122	30
130	40	0	50	227	60
0	70	257	80	265	90
271	100	273	110	310	120
0	130	326	140	355	150
0	160	372	170	404	180
0	190	424	200	0	210
450	220	454	230	476	240
526	250	0	260	631	270
0	280	655	290	657	300
E77	310	712	320	0	330
730	340	755	350	0	360
773	370	777	380	1000	390
1007	400	1025	410	0	420
1057	430	1065	440	1073	450

STATEMENT LABELS

1101	460		1107	470		1117	480	
1134	490		0	500		1222	510	
0	520		1264	530		0	540	
1302	550		1331	560		0	570	
1360	580		1366	590		1403	600	
1407	610		1413	620		1430	630	
1446	640		1474	650		1502	660	
0	670		1571	680		0	690	
1617	700		0	710		1635	720	
1664	730		0	740		1702	750	
1710	760		1736	770		1744	780	
1750	790		1751	800		1771	810	
1773	820		2001	830		2007	840	
2015	850		2023	860		2031	870	
2035	880	FMT	2045	890	FMT	2060	900	FMT
2073	910	FMT	2077	920	FMT			

COMMON BLOCKS LENGTH

COM1	10517

STATISTICS

PROGRAM LENGTH	22048	1156
COMMON LENGTH	244258	10517

```
                SUBROUTINE NORMAL (DIST,MEAN,STANDV,RST)                    LUT    1
          10    AA=0.                                                       LUT    2
                DO 20 I=1,12                                                LUT    3
                YYL=RANF(RST)                                               LUT    4
    5     20    AA=AA+YYL                                                   LUT    5
                AA=AA-6.                                                    LUT    6
                DIST=STANDV*AA+MEAN                                         LUT    7
                IF (DIST.LT.0.) GO TO 10                                    LUT    8
                RETURN                                                      LUT    9
   10           END                                                         LUT   10-
```

SYMBOLIC REFERENCE MAP

ENTRY POINTS
2 NORMAL

VARIABLES	SN	TYPE	RELOCATION				
44	AA	REAL		0	DIST	REAL	F.P.
45	I	INTEGER		0	MEAN	INTEGER	F.P.
0	RST	REAL	F.P.	0	STANDV	REAL	F.P.
46	YYL	REAL					

EXTERNALS	TYPE	ARGS
RANF	REAL	1

STATEMENT LABELS
14 10 0 20

STATISTICS
PROGRAM LENGTH 578 47

```
      SUBROUTINE CIDSTA (IDSTAT)                                          CID   1
      COMMON /COM1/ G,HF,IDAYS,K1,K2,M51,N,FRAME(350,17),HSHIP(150,6),FIC CID   2
     1ER(25,8),SHIP(150,22),STREMN(80,2)                                  CID   3
      DIMENSION IDSTAT(150,14,2)                                          CID   4
 5    INTEGER HSHIP                                                       CID   5
      DO 110 J=1,K1                                                       CID   6
      IN=HSHIP(J,4)                                                       CID   7
C     ************** CHECK IN-PORT STATUS ******************************CID   8
      IF (IN.EQ.0) GO TO 10                                               CID   9
10    C     ************** SHIP IN PORT ***********************************CID  10
      GO TO (30,40,50,40,30,50,40,60,50,80,70,90), IN                     CID  11
C     ************** SHIP IS NOT IN PORT--CHECK IF EXT-OPS OR OUT ON ***CID  12
C     ************** WEEKLY CYCLE ***********************************CID  13
      10    IF (HSHIP(J,6).EQ.2) GO TO 20                                 CID  14
15    IF (HSHIP(J,6).NE.1) RETURN                                         CID  15
C     ************** SHIP IS ON EXT-OPS *****************************CID  16
      I=14                                                                CID  17
      GO TO 100                                                           CID  18
C     ************** SHIP IS OUT ON WEEKLY OPS **********************CID  19
20    20    I=12                                                          CID  20
      GO TO 100                                                           CID  21
C     ************** SHIP IS STNDDWN OR P.O.M. ON C.I. AT PIERSIDE OR **CID  22
C     ************** NESTED AT PIER *********************************CID  23
      30    I=(SHIP(J,20)+100.)/100.                                      CID  24
25    GO TO 100                                                           CID  25
C     ************** SHIP NEEDS C.I. FOR P.O.M. OR STNDDWN AND IS AT ***CID  26
C     ************** PIERSIDE WITHOUT IT,OR SHIP MAY BE NOR-OPS AT *****CID  27
C     ************** PIERSIDE OR NESTED WITHOUT UTILITIES ***************CID  28
      40    I=(SHIP(J,20)+600.)/100.                                      CID  29
30    GO TO 100                                                           CID  30
C     ************** SHIP IS NOR-OPS AND RECEIVING PARTIAL UTILITIES ***CID  31
C     ************** AT PIERSIDE OR NESTED AT PIER OR IS AT TENDER *****CID  32
      50    I=4                                                           CID  33
      GO TO 100                                                           CID  34
35    C     ************** SHIP IS GETTING UTILITIES AT TENDER ***************CID  35
      60    I=5                                                           CID  36
      GO TO 100                                                           CID  37
C     ************** SHIP IS IN STREAM--NOR-OPS,PRE-STNDN,OR PRE-P.O.M. CID  38
      70    I=(SHIP(J,20)+900.)/100.                                      CID  39
40    GO TO 100                                                           CID  40
C     ************** SHIP IS AT TENDER WITH NO UTILITIES ***************CID  41
      80    I=6                                                           CID  42
      GO TO 100                                                           CID  43
C     ************** SHIP IN OVERHAUL *******************************CID  44
45    90    I=13                                                          CID  45
      100   IDSTAT(J,I,1)=1+IDSTAT(J,I,1)                                 CID  46
      110   CONTINUE                                                      CID  47
      RETURN                                                              CID  48
      END                                                                 CID  49-
```

SYMBOLIC REFERENCE MAP

ENTRY POINTS
2 CIDSTA

VARIABLES	SN	TYPE		RELOCATION						
7	FRAME	REAL	ARRAY	COM1	0	G	REAL		COM1
1	HF	REAL		COM1	13505	HSHIP	INTEGER	ARRAY	COM1
117	I	INTEGER			2	IDAYS	INTEGER		COM1
0	IDSTAT	INTEGER	ARRAY	F.P.	116	IN	INTEGER		
115	J	INTEGER			3	K1	INTEGER		COM1
4	K2	INTEGER		COM1	5	M51	INTEGER		COM1
6	N	INTEGER		COM1	15311	PIER	REAL	ARRAY	COM1
15621	SHIP	REAL	ARRAY	COM1	24165	STREMN	REAL	ARRAY	COM1

STATEMENT LABELS

44	10	55	20	57	30		
63	40	67	50	71	60		
73	70	77	80	101	90		
102	100	0	110				

COMMON BLOCKS	LENGTH
COM1	10517

STATISTICS

PROGRAM LENGTH	1228	82
COMMON LENGTH	24425B	10517

```
      SUBROUTINE PRTFR (IPORT,ITHOAT,IX)                                JR1   1
      COMMON /COM1/ G,HF,IDAYS,K1,K2,M51,N,FRAME(350,17),FSHIP(150,6),PIJR1   2
     1ER(25,8),SHIP(150,22),STREAM(80,2)                                JR1   3
      DIMENSION IPORT(2)                                                JR1   4
 5    DO 10 I=1,K2                                                      JR1   5
      IF (MOD(I,50).NE.1) GO TO 10                                      JR1   6
      PRINT 20, IPORT,ITHOAT,IX                                         JR1   7
      PRINT 30                                                          JR1   8
   10 PRINT 40, I,(FRAME(I,J),J=1,17)                                   JR1   9
10    RETURN                                                            JR1  10
C                                                                       JR1  11
   20 FORMAT(1H1,T48,*FRAMES AND PIERS *,2A8,T96,*START DAY *,I5,       JR1  12
     1*   QUARTER *,I3)                                                 JR1  13
   30 FORMAT (1H0,T5,*FRAME*,T14,*STATUS*,T23,*STEAM*,T31,*A.C.*,T38,*NEJR1  14
15   1ST*,T45,*1ST*,T51,*2ND*,T57,*3RD*,T63,*4TH*,T69,*5TH*,T75,*LAP*,T8JR1  15
     21,*STEAM*,T89,*A.C.*,T96,*SHIP*,T103,*SHIP*,T110,*SHIP*,T117,*NESTJR1  16
     3*,T126,*PIER*,/T6,*NO.*,T14,*OCC.=2*,T23,*AVAIL*,T30,*AVAIL*,T38,*JR1  17
     4AVAIL*,T45,*PR.*,T51,*PR*,T57,*PR.*,T63,*PR.*,T69,*PR.*,T74,*BEG=1JR1  18
     5*,T82,*IN*,T90,*IN*,T97,*NO.*,T103,*NAME*,T111,*SEQ*,T117,*USED*,TJR1  19
20   6127,*NO.*,/T14,*NOT=1*,T74,*END=2*,T82,*USE*,T90,*USE*,T111,*NO.*)JR1  20
   40 FORMAT (1H ,T6,I3,T17,F2.0,T23,F4.0,T29,F4.0,T38,F2.0,T45,F3.0,T51JR1  21
     1,F3.0,T57,F3.0,T63,F3.0,T69,F3.0,T76,F2.0,T81,F4.0,T88,F4.0,T96,F4JR1  22
     2.0,T103,A4,T111,F3.0,T118,F3.0,T127,F3.0)                         JR1  23
      END                                                               JR1  24-
```

SYMBOLIC REFERENCE MAP

ENTRY POINTS
2 PRTFR

VARIABLES	SN	TYPE		RELOCATION					
7	FRAME	REAL	ARRAY	COM1	0	G	REAL		COM1
1	HF	REAL		COM1	13505	HSHIP	REAL	ARRAY	COM1
165	I	INTEGER			2	IDAYS	INTEGER		COM1
0	IPORT	INTEGER	ARRAY	F.P.	0	ITHDAT	INTEGER		F.P.
8	IX	INTEGER		F.P.	166	J	INTEGER		
3	K1	INTEGER		COM1	4	K2	INTEGER		COM1
5	M51	INTEGER		COM1	6	N	INTEGER		COM1
15311	PIER	REAL	ARRAY	COM1	15621	SHIP	REAL	ARRAY	COM1
24165	STREMN	REAL	ARRAY	COM1					

FILE NAMES	MODE
OUTPUT	FMT

INLINE FUNCTIONS	TYPE	ARGS	
MOD	INTEGER	2	INTRIN

STATEMENT LABELS
37 10 60 20 FMT 70 30 FMT
143 40 FMT

COMMON BLOCKS	LENGTH
COM1	10517

STATISTICS
PROGRAM LENGTH 1750 125
COMMON LENGTH 244250 10517

```
                      SUBROUTINE TPCNTP (IPCRT,ITHDAY,IJ9A,IX,IDYLST)                    TPC   1
                      COMMON /COM2/ IJ1,IJ2,I2J,IJ3,IJ4,I4J,IJ6,IJ7,IJ8,IJ9,NO           TPC   2
                      DIMENSION IPORT(2)                                                 TPC   3
                      IF (ITHDAY.GT.IDYLST) GO TO 100                                    TPC   4
 5                    IF (IJ2.EQ.0.AND.I2J.EQ.0.AND.IJ4.EQ.0) GO TO 30                   TPC   5
                      IF (IJ1.EQ.1) GO TO 90                                             TPC   6
                10    IND1=IJ2                                                           TPC   7
                      IND2=IJ2+I2J                                                       TPC   8
                      IF (ITHDAY.LT.IND1) GO TO 30                                       TPC   9
10                    IF (ITHDAY.GE.IND1.AND.ITHDAY.LT.IND2) GO TO 50                    TPC  10
                      IF (IJ3.EQ.0) GO TO 30                                             TPC  11
                      IND3=IND2+IJ3                                                      TPC  12
                      IF (ITHDAY.GE.IND2.AND.ITHDAY.LT.IND3) GO TO 30                    TPC  13
                      IF (IJ4.EQ.0) GO TO 30                                             TPC  14
15                    IND4=IND3+IJ4                                                      TPC  15
                20    IF (ITHDAY.GE.IND3.AND.ITHDAY.LT.IND4) GO TO 50                    TPC  16
                      IF (I4J.EQ.0) GO TO 30                                             TPC  17
                      IND5=IND4+I4J                                                      TPC  18
                      IF (ITHDAY.GE.IND4.AND.ITHDAY.LT.IND5) GO TO 30                    TPC  19
20                    IND3=IND5                                                          TPC  20
                      IND4=IND3+IJ4                                                      TPC  21
                      IF (IND4.LE.IDYLST) GO TO 20                                       TPC  22
                30    IJ9A=0                                                             TPC  23
                40    IF (ITHDAY.EQ.1) IJ9A=1                                            TPC  24
25                    RETURN                                                             TPC  25
                50    IF (IJ6.NE.1) GO TO 60                                             TPC  26
                      CALL PRTHS (IPCRT,ITHDAY,IX)                                       TPC  27
                60    IF (IJ7.NE.1) GO TO 70                                             TPC  28
                      CALL PRTPR (IPCRT,ITHDAY,IX)                                       TPC  29
30              70    IF (IJ9.EQ.1) GO TO 80                                             TPC  30
                      IJ9A=0                                                             TPC  31
                      GO TO 40                                                           TPC  32
                80    IJ9A=1                                                             TPC  33
                      GO TO 110                                                          TPC  34
35              90    IJ6=1                                                              TPC  35
                      IJ7=1                                                              TPC  36
                      IJ9=1                                                              TPC  37
                      GO TO 10                                                           TPC  38
                100   PRINT 120, ITHDAY                                                  TPC  39
40                    STOP 115                                                           TPC  40
                110   RETURN                                                             TPC  41
                C                                                                        TPC  42
                120   FORMAT(1H0,25X,*VALUE OF DAY TO BE PRINTED, EXCEEDS ALLOWED LENGTHTPC  43
                     1   ITHDAY VALUE WAS *,I6)                                        TPC  44
45                    END                                                                TPC  45-
```

SYMBOLIC REFERENCE MAP

ENTRY POINTS
2 TFCNTP

VARIABLES	SN	TYPE	RELOCATION					
0	IDYLST	INTEGER	F.P.	0	IJ1	INTEGER		COM2
1	IJ2	INTEGER	COM2	3	IJ3	INTEGER		COM2
4	IJ4	INTEGER	COM2	6	IJ6	INTEGER		COM2
7	IJ7	INTEGER	COM2	10	IJ8	INTEGER		COM2
11	IJ9	INTEGER	COM2	0	IJ9A	INTEGER		F.P.
156	IND1	INTEGER		157	IND2	INTEGER		
160	IND3	INTEGER		161	IND4	INTEGER		
162	IND5	INTEGER		0	IPORT	INTEGER	ARRAY	F.P.
0	ITHDAY	INTEGER	F.P.	0	IX	INTEGER		F.P.
2	I2J	INTEGER	COM2	5	I4J	INTEGER		COM2
12	NC	INTEGER	COM2					

FILE NAMES	MODE
OUTPUT	FMT

EXTERNALS	TYPE	ARGS		
PRTFR		3	FPTHS	3

STATEMENT LABELS

20	10	44	20	65	30		
66	40	75	50	105	60		
115	70	122	80	124	90		
127	100	136	110	144	120	FMT	

COMMON BLOCKS	LENGTH
COM2	11

STATISTICS

PROGRAM LENGTH	165B	117
COMMON LENGTH	13B	11

```
                      SUBROUTINE PRTHS (IPORT,ITHDAY,IX)                                JR1   1
                      COMMON /COM1/ G,HF,IDAYS,K1,K2,M51,N,FRAME(350,17),HSHIP(150,6),PIJR1   2
                     1ER(25,8),SHIP(150,22),STREAM(80,2)                                JR1   3
                      DIMENSION IPORT(2)                                                JR1   4
 5                    INTEGER HSHIP                                                     JR1   5
                      DO 190 I=1,K1                                                     JR1   6
                      IF (HOC(I,50).NE.1) GO TO 10                                      JR1   7
                      PRINT 200, IPORT,ITHDAY,IX                                        JR1   8
                      PRINT 210                                                         JR1   9
10          10        PRINT 220, (SHIP(I,J),J=1,4)                                      JR1  10
            C         ****** CHECK IF SHIP IS OUT ***************************************JR1  11
                      IF (HSHIP(I,2).GE.2) GO TO 40                                     JR1  12
            C         ****** SHIP IS IN **********  *************************************JR1  13
                      PRINT 230                                                         JR1  14
15                    IF (HSHIP(I,4).EQ.11) GO TO 20                                    JR1  15
                      GO TO 60                                                          JR1  16
            C         ****** SHIP IS IN STREAM ******************************************JR1  17
            20        PRINT 240, HSHIP(I,3)                                             JR1  18
                      GO TO 180                                                         JR1  19
20          C         ***************** SHIP IS IN OVERHAUL ***************************JR1  20
            30        PRINT 250, HSHIP(I,3)                                             JR1  21
                      GO TO 180                                                         JR1  22
            C         ****** SHIP OUT ***************************************************JR1  23
            40        IF (HSHIP(I,4).EQ.12) GO TO 30                                    JR1  24
25                    PRINT 260, HSHIP(I,3)                                             JR1  25
            C         ****** CHECK IF SHIP ON NORM OPS OUT OR EXT OPS ******************JR1  26
                      IF (HSHIP(I,6)-1.EQ.0) GO TO 50                                   JR1  27
            C         ********************** NORM OPS *********************************JR1  28
                      PRINT 270                                                         JR1  29
30                    GO TO 180                                                         JR1  30
            C         ********************** EXT OPS **********************************JR1  31
            50        PRINT 280                                                         JR1  32
                      GO TO 180                                                         JR1  33
            60        J=HSHIP(I,4)                                                      JR1  34
35                    IF (J.LE.0) GO TO 170                                             JR1  35
                      GO TO (70,80,90,100,110,120,130,140,150,160,180,180), J           JR1  36
            C         ********************** C.I. AT PIERSIDE *************************JR1  37
            70        PRINT 290, HSHIP(I,3),HSHIP(I,5)                                  JR1  38
                      GO TO 180                                                         JR1  39
40          C         ********************** NO C.I. AT PIERSIDE **********************JR1  40
            80        PRINT 300, HSHIP(I,3),HSHIP(I,5)                                  JR1  41
                      GO TO 180                                                         JR1  42
            C         ********************** PARTIAL UTILIIIES AT PIERSIDE ************JR1  43
            90        PRINT 310, HSHIP(I,3),HSHIP(I,5)                                  JR1  44
45                    GO TO 180                                                         JR1  45
            C         ********************** NO UTILITIES AT PIERSIDE *****************JR1  46
            100       PRINT 320, HSHIP(I,3),HSHIP(I,5)                                  JR1  47
                      GO TO 180                                                         JR1  48
            C         ********************** C.I. NESTED AT PIER **********************JR1  49
50          110       PRINT 330, HSHIP(I,3),HSHIP(I,5)                                  JR1  50
                      GO TO 180                                                         JR1  51
            C         ********************** PARTIAL UTILITIES NESTED AT PIER *********JR1  52
            120       PRINT 340, HSHIP(I,3),HSHIP(I,5)                                  JR1  53
                      GO TO 180                                                         JR1  54
55          C         ********************** NO UTILITIES NESTED AT PIER **************JR1  55
```

```
      130   PRINT 350, HSHIP(I,3),HSHIP(I,5)                                  JR1  56
            GO TO 180                                                         JR1  57
      C     ********************* C.I. AT TENDER ***************************  JR1  58
      140   PRINT 360, HSHIP(I,3),HSHIP(I,5)                                  JR1  59
      60    GO TO 180                                                         JR1  60
      C     *************** PARTIAL UTILITIES AT TENDER ********************  JR1  61
      150   PRINT 370, HSHIP(I,3),HSHIP(I,5)                                  JR1  62
            GO TO 180                                                         JR1  63
      C     *************** NO UTILITIES AT TENDER *************************  JR1  64
      65    160   PRINT 380, HSHIP(I,3),HSHIP(I,5)                            JR1  65
            GO TO 180                                                         JR1  66
      170   PRINT 390, HSHIP(I,3)                                             JR1  67
      180   IP=SHIP(I,20)/100.                                                JR1  68
            IF (IP.EQ.0.OR.HSHIP(I,2).EQ.2) GO TO 190                         JR1  69
      70    PRINT 400, IP                                                     JR1  70
      190   CONTINUE                                                          JR1  71
            RETURN                                                            JR1  72
      C                                                                       JR1  73
      200   FORMAT(1H1,T48,*HOMEPORTED SHIPS *,2A8,T90,*START DAY *,I5,       JR1  74
      75         1*   QUARTER *,I3)                                           JR1  75
      210   FORMAT(1H0,T2,*SHIP*,T8,*NAME*,T14,*SEQ.*,T19,                    JR1  76
           1 *CLASS*,T26,*IN OUT*,T34,*DAYS*,T42,*--------------------*,       JR1 765
           2 T64,*PIER ---------------------*,T95,*HIGH*,T102,*STREAM*,T110,  JR1  77
           3 *OVRH*,T119,*SHIP CYCLE*,/T3,*NO.*,T14,*NO.*,T18,*(1./2.3*,      JR1 775
      80   4 T35,*TO*,T42,*---- PIERSIDE ---*,T62,                           JR1  78
           5 *-- NESTED ----*,T78,*---- TENDER --*,T95,                       JR1  79
           6 *FRAME*,T117,*NCR OPS*,T128,*EXT*,/T19,*=TNDR)*,T35,             JR1  80
           7 *60*,T42,*C.I. NO PART  NO*,T62,*C.I. PART*,                     JR1  81
           8 T73,*NO*,T78,*C.I. PART  NO*,T119,*OUT*,T128,  *OPS*,/           JR1  82
      85   9 T46,*C.I.UTIL UTIL*,T67,*UTIL UTIL*,T83,*UTIL UTIL*)            JR1  83
      220   FORMAT (T2,F5.0,T8,A4,T14,F3.0,T20,F3.1)                          JR1  84
      230   FORMAT (1H+,T27,*X*)                                              JR1  85
      240   FORMAT (1H+,T105,*X*,T33,I5)                                      JR1  86
      250   FORMAT (1H+,T33,I5,T112,*X*)                                      JR1  87
      90    260   FORMAT (1H+,T30,*X*,T33,I5)                                 JR1  88
      270   FORMAT (1H+,T120,*X*)                                             JR1  89
      280   FORMAT (1H+,T129,*X*)                                             JR1  90
      290   FORMAT (1H+,T43,*X*,T33,I5,T95,I4)                                JR1  91
      300   FORMAT (1H+,T47,*X*,T33,I5,T95,I4)                                JR1  92
      95    310   FORMAT (1H+,T52,*X*,T33,I5,T95,I4)                          JR1  93
      320   FORMAT (1H+,T57,*X*,T33,I5,T95,I4)                                JR1  94
      330   FORMAT (1H+,T63,*X*,T33,I5,T95,I4)                                JR1  95
      340   FORMAT (1H+,T68,*X*,T33,I5,T95,I4)                                JR1  96
      350   FORMAT (1H+,T74,*X*,T33,I5,T95,I4)                                JR1  97
      100   360   FORMAT (1H+,T79,*X*,T33,I5,T95,I4)                          JR1  98
      370   FORMAT (1H+,T83,*X*,T33,I5,T95,I4)                                JR1  99
      380   FORMAT (1H+,T89,*X*,T33,I5,T95,I4)                                JR1 100
      390   FORMAT (1H+,T33,I5,T120,*X*)                                      JR1 101
      400   FORMAT (1H+,T39,*P*,I1)                                           JR1 102
      105         END                                                         JR1 103-
```

SYMBOLIC REFERENCE MAP

ENTRY POINTS
2 PRTHS

VARIABLES	SN	TYPE		RELOCATION					
7	FRAME	REAL	ARRAY	COM1	0	G	REAL		COM1
1	HF	REAL		COM1	13505	HSHIP	INTEGER	ARRAY	COM1
514	I	INTEGER			2	IDAYS	INTEGER		COM1
516	IP	INTEGER			0	IPORT	INTEGER	ARRAY	F.P.
0	ITHDAY	INTEGER		F.P.	0	IX	INTEGER		F.P.
515	J	INTEGER			3	K1	INTEGER		COM1
4	K2	INTEGER		COM1	5	M51	INTEGER		COM1
6	N	INTEGER		COM1	15311	PIER	REAL	ARRAY	COM1
15621	SHIP	REAL	ARRAY	COM1	24165	STREMN	REAL	ARRAY	COM1

FILE NAMES	MODE
OUTPUT	FMT

INLINE FUNCTIONS	TYPE	ARGS	
MOD	INTEGER	2	INTRIN

STATEMENT LABELS

37	10		64	20		72	30		
100	40		121	50		125	60		
151	70		161	80		171	90		
201	100		211	110		221	120		
231	130		241	140		251	150		
261	160		271	170		276	180		
312	190		316	200	FMT	326	210	FMT	
406	220	FMT	413	230	FMT	416	240	FMT	
421	250	FMT	424	260	FMT	427	270	FMT	
432	280	FMT	435	290	FMT	441	300	FMT	
445	310	FMT	451	320	FMT	455	330	FMT	
461	340	FMT	465	350	FMT	471	3E0	FMT	
475	370	FMT	501	380	FMT	505	390	FMT	
510	400	FMT							

COMMON BLOCKS	LENGTH
COM1	10517

STATISTICS

PROGRAM LENGTH	5258	341
COMMON LENGTH	24425B	10517

```
      SUBROUTINE PRTQTR (NQ,IX,IPORT,IDSTAT)                                PRT   1
      COMMON /COM1/ G,HF,IDAYS,K1,K2,M51,N,FRAME(350,17),HSHIP(150,6),FIRST  2
     1ER(25,8),SHIP(150,22),STREAM(80,2)                                    PRT   3
      DIMENSION IPORT(2), IDSTAT(150,14,2)                                  PRT   4
      DIMENSION ISUMD(14)                                                   PRT   5
      DIMENSION PRCNT(14)                                                   PRT   6
C     ********** CHECK IF TIME TO PRINT FINAL SUMMARY ***************       PRT   7
      IF (IX.GT.NQ) GO TO 40                                                PRT   8
C     ************** ADD-UP COLUMNS TO GET TOTALS ************************PRT  11
      DO 10 J=1,14                                                          PRT  12
      ISUM=0                                                                PRT  13
      DO 10 I=1,K1                                                          PRT  14
      ISUM=ISUM+IDSTAT(I,J,1)                                               PRT  15
   10 ISUMD(J)=ISUM                                                         PRT  16
C     ***************** PRINT QUARTERLY SUMMARY VALUES *****************    PRT  17
      DO 30 I=1,K1                                                          PRT  18
      IF (MOD(I,50).NE.1) GO TO 20                                          PRT  19
      PRINT 110, IPORT,IX                                                   PRT  20
      PRINT 120                                                             PRT  21
   20 PRINT 130, (SHIP(I,J),J=2,4),(IDSTAT(I,J,1),J=1,14)                   PRT  22
   30 CONTINUE                                                              PRT  23
C     ********************** PRINT TOTALS ****************************     PRT  24
      PRINT 140, (ISUMD(I),I=1,14)                                          PRT  25
      IF (IX.LT.NQ) RETURN                                                  PRT  26
C     ********************** PRINT FINAL SUMMARY **********************    PRT  27
C     ********************** PRINT MAJOR HEADER ***********************    PRT  28
C     ********************** PRINT MINOR HEADERS **********************    PRT  29
C     ***************** PRINT FINAL SUMMARY VALUES *********************    PRT  30
   40 DO 60 I=1,K1                                                          PRT  31
      IF (MOD(I,50).NE.1) GO TO 50                                          PRT  32
      PRINT 150, IPORT                                                      PRT  33
      PRINT 120                                                             PRT  34
   50 PRINT 130, (SHIP(I,J),J=2,4),(IDSTAT(I,J,2),J=1,14)                   PRT  35
   60 CONTINUE                                                              PRT  36
C     ***************** ADD-UP COLUMNS TO GET TOTALS ********************    PRT  37
      DO 80 J=1,14                                                          PRT  38
      ISUM=0                                                                PRT  39
      DO 70 I=1,K1                                                          PRT  40
   70 ISUM=ISUM+IDSTAT(I,J,2)                                               PRT  41
   80 ISUMD(J)=ISUM                                                         PRT  42
C     ********************** PRINT TOTALS ****************************     PRT  43
      PRINT 140, (ISUMD(I),I=1,14)                                          PRT  44
      TOTAL=0.0                                                             PRT  45
      DO 90 I=1,14                                                          PRT  46
   90 TOTAL=TOTAL+ISUMD(I)                                                  PRT  47
      DO 100 I=1,14                                                         PRT  48
  100 PRCNT(I)=100.*ISUMD(I)/TOTAL                                          PRT  49
      PRINT 160, (PRCNT(I),I=1,14)                                          PRT  50
      STOP 3                                                                PRT  51
C                                                                           PRT  52
  110 FORMAT(1H1,T14,2A8,T38,*SUMMARY  BY  QUARTERS*,T73,*QUARTER*,T82,     PRT  53
     1I3,T90,*(NON-CUMULATIVE)*,T62, *---------*)                           PRT  54
  120 FORMAT(1H0,T20,*------ AT PIER WITH UTILITIES --------*,              PRT  55
     1T63,*-- AT PIER WITHOUT --*,        T88,                             PRT  555
     2*----- IN STREAM -----*,/T20,*---------- PIERSIDE ----------*,       PRT  56
```

```
      3T63,*---- UTILITIES ------*,T113,*NOR-*,T120,*IN*,T129,                  FRT  565
      4*CN*,/T2,*NAME*,T8,*SEC*,T13,*CLASS*,T20,                                FRT   57
      5*-------- O.T. -------*,T46,*PART*,T54,*AT*,T64,*NCR-*,                  FRT  575
      6T72,*PRE*,T113,*CPS*,T119,*OVER-*,T128,*EXT-*,T8C,                       FRT   58
60    7  *PRE*,T89,*NOR-*,T97,*PRE*,T105,*PRE*,/T8,                            FRT   59
      8*NC.*,T20,*NCR-OPS*,T29,*STNDN*,T38,*POM*,T46,                           FRT   60
      9*UTIL*,T52,*TENDER*,T64,*OPS*,T71,*STNON*,                               FRT   61
      =T8C,*PCM*,T89,*OPS*,T96,*STNDN*,T105,*PCM*,                              FRT   62
      =T113,*CUT*,T119,*HAUL*,T128,*CPS*,/T2)                                   FRT   63
65          130   FORMAT (T2,A4,T7,F3.0,T14,F3.0,T21,5(I5,3X),T63,3(I5,3X),T88,3(I5,PRT   64
      13X),T112,2(I5,2X),T127,I5)                                               PRT   65
            140   FORMAT (1HC,T8,*TOTALS*,T21,5(I5,3X),T63,3(I5,3X),T88,3(I5,3X),T11PRT   66
      12,2(I5,2X),T127,I5)                                                      PRT   67
            150   FORMAT (1H1,T14,2A8,T32,*FINAL SUMMARY  BY *,                 FRT   68
70    1  T51,*QUARTERS   FOR  ALL   QUARTERS*,T87,                              FRT  685
      2  *(CUMMULATIVE)*)                                                       PRT   69
            160   FORMAT (1H ,T4,*PERCENTAGE*,T21,5(F5.1,3X),T63,3(F5.1,3X),T88,3(F5PRT   70
      1.1,3X),T112,2(F5.1,2X),T127,F5.1)                                        PRT   71
            END                                                                 FRT   72-
```

SYMBOLIC REFERENCE MAP

ENTRY POINTS
2 PRTOTR

VARIABLES	SN	TYPE		RELOCATION
7	FRAME	REAL	ARRAY	COM1
1	HF	REAL		COM1
401	I	INTEGER		
0	IDSTAT	INTEGER	ARRAY	F.P.
400	ISUM	INTEGER		
0	IX	INTEGER		F.P.
3	K1	INTEGER		COM1
5	M51	INTEGER		COM1
0	NO	INTEGER		F.P.
421	PRCNT	REAL	ARRAY	
24165	STREMN	REAL	ARRAY	COM1
0	G	REAL		CCM1
13505	MSHIP	REAL	ARRAY	CCM1
2	IDAYS	INTEGER		CCM1
0	IPORT	INTEGER	ARRAY	F.P.
403	ISUMO	INTEGER	ARRAY	
377	J	INTEGER		
4	K2	INTEGER		CCM1
6	N	INTEGER		CCM1
15311	PIER	REAL	ARRAY	CCM1
15621	SHIP	REAL	ARRAY	COM1
402	TOTAL	REAL		

FILE NAMES	MODE
OUTPUT	FMT

INLINE FUNCTIONS	TYPE	ARGS	
MOD	INTEGER	2	INTRIN

STATEMENT LABELS

0	10		54	20		0	30				
113	40		132	50		0	60				
0	70		0	80		0	90				
0	100		226	110	FMT	241	120	FMT			
326	130	FMT	340	140	FMT	351	150	FMT			
364	160	FMT									

COMMON BLOCKS	LENGTH
CCM1	10517

STATISTICS

PROGRAM LENGTH	4578	303
COMMON LENGTH	24425E	10517

```
CORE MAF  17.47.55.  NORMAL                CONTROL                                                  000100    063002    000000    000000
        ---TIME---LOAD MODE --L1--L2-----TYPE---------------USER---++---CALL-------------FWA LOAD--LWA LOAD--BLNK COMN--LENGTH--
        FWA LOADER  100707  FWA TABLES  075453
        -PROGRAM----ADDRESS-                    --LABELED---COMMON--
        SHIPIN      024540                                COM1        000100
                                                          COM2        024525
        PLACE       050562                                COM1        000100
        NORMAL      052766
        CIDSTA      053045                                COM1        000100
        PRTFR       053167                                COM1        000100
        TPONTP      053364                                COM2        024525
        PRTHS       053551                                COM1        000100
        PRTQTR      054276                                COM1        000100
        GETBA       054755
        SYSTEM$     054774
        ACGOER$     055774
        INPUTC$     056007
        KODER$      056133
        KRAKER$     057543
        OUTPTC$     061271
        RANOOME     061365
        RANF$       061367
        SIO$        061374
        ----UNSATISFIED EXTERNALS-----                                REFERENCES
```

APPENDIX B

MAJOR ARRAYS

Appendix B contains definitions of the components of the major internal computer storage arrays.

MAJOR ARRAYS

1. SHIP (N, 1) = Ship number
   SHIP (N, 2) = Ship name
   SHIP (N, 3) = Sequence number
   SHIP (N, 4) = Ship class if tender
   SHIP (N, 5) = Mean for time between extended operations
   SHIP (N, 6) = Standard deviation for time between extended operations
   SHIP (N, 7) = Mean for time on extended operations
   SHIP (N, 8) = Standard deviation for time on extended operations
   SHIP (N, 9) = Mean for time in overhaul
   SHIP (N, 10) = Standard deviation for time in overhaul
   SHIP (N, 11) = Mean for time between overhauls
   SHIP (N, 12) = Standard deviation for time between overhauls
   SHIP (N, 13) = Days at tender per quarter
   SHIP (N, 14) = AC Power required
   SHIP (N, 15) = Frames required
   SHIP (N, 16) = Steam required
   SHIP (N, 17) = Number of ships which can nest outside ship
   SHIP (N, 18) = AC Power furnishing capability (if tender)
   SHIP (N, 19) = Steam furnishing capability (if tender)
   SHIP (N, 20) = Index
   SHIP (N, 21) = Steam being used (temporary storage)
   SHIP (N, 22) = Electric power being used (temporary storage)

2. HSHIP (N, 1) = Ship number
   HSHIP (N, 2) = Port status
   1 = In port
   2 = Out of port
   HSHIP (N, 3) = Duration of stay in present status

HSHIP (N, 4) = In port status

0 = Not in port

1 = Cold iron-pierside

2 = Not used

3 = Partial utilities-pierside

4 = No utilities-pierside

5 = Cold iron-nested at pier

6 = Partial utilities-nested at pier

7 = No utilities-nested at pier

8 = At tender

9 = Not used

10 = Not used

11 = In stream

12 = In overhaul

HSHIP (N, 5) = Highest frame occupied by ship

HSHIP (N, 6) = Present state

1 = Extended operations

2 = Normal operations (weekly cycle)

3 = Overhaul

4 = 30-day stand-down

5 = POM

6 = Tender supplying utilities

3. FRAME (N, 1) = Frame status

1 = Available

2 = Occupied

FRAME (N, 2) = Steam capability

FRAME (N, 3) = AC Power capability

FRAME (N, 4) = Number permitted to nest

FRAME (N, 5) = Index of ship which is 1st preference in berth

FRAME (N, 6) = Index of ship which is 2nd preference in berth

FRAME (N, 7) = Index of ship which is 3rd preference in berth

FRAME (N, 8) = Index of ship which is 4th preference in berth

FRAME (N, 9) = Index of ship which is 5th perference in berth

99 = No ship can berth there

FRAME (N, 10) = End of pier code

0 = Frame in middle of pier

1 = Frame at beginning of pier

2 = Frame at end of pier

FRAME (N, 11) = Steam in use

FRAME (N, 12) = AC Power in use

FRAME (N, 13) = Ship number berthed pierside

FRAME (N, 14) = Ship name berthed pierside

FRAME (N, 15) = Ship sequence number berthed pierside

FRAME (N, 16) = Number of ships nested at frame

FRAME (N, 17) = Pier number

4. NODAYS (N, 1) = Number of days remaining until overhaul

NODAYS (N, 2) = Number of days remaining until tender

NODAYS (N, 3) = Number of days remaining until extended operation

APPENDIX C

SAMPLE INPUT

Appendix C contains a listing of the data for a sample run.

```
'     END OF RECORD MARKER (7-8-9 PUNCH)
  8 24  2 11      10  70  11          NEW LONDON TEST
000 ASR0100099990000000000000030.5003700100000001002903300000000004600000000
000 SSN0100000120010005O.500050.5003000100210007000004100000000003900000000
000 SSN0200000120010005O.500050.5003000100210007000004100000000003900000000
000 SSN0300000120010005O.500050.5003000100210007000004100000000003900000000
000 SSN0400000120010005O.500050.5003000100210007000004100000000003900000000
000 SSN0500000120010005O.500050.5003000100210007000004100000000003900000000
000 SSN0600000120010005O.500050.5003000100210007000004100000000003900000000
000 SSN0700000120010005O.500050.5003000100210007000004100000000003900000000
0011000054...2399999999910000000000     000001
0021000054...2399999999900000000000     0 0 01
0031000054...2399999999900000000000     0 0 011
0041000054...2399999999900000000000     0 0 01
0051000054...2399999999900000000000     0 0 01
0061000054...2399999999900000000000     0 0 01
0071000054...2399999999900000000000     0 0 01
0081000054...2399999999920000000000     0 0001
0091000054...0469999999910000000000     000001
0101000054...0469999999900000000000     0 0001
0111000054...0469999999900000000000     0 0001
0121000054...0999999999900000000000     0 0001
0131000054...0999999999900000000000     0 0001
0141000054...0999999999900000000000     0 0 01
0151000054...0999999999900000000000     0 0 01
0161000054...0999999999920000000000     000001
0171000000000139999999991000000000      000002
0181000000000139999999990000000000      0 0002
0191000000000139999999990000000000      0 0002
0201000000000139999999992000000000      0 0002
0211000000000139999999991000000000      0 0002
0221000000000139999999990000000000      0 0002
0231000000000139999999990000000000      0 0002
0241000000000139999999992000000000      000002
0100000005400000000000000
02000000000000
'     END OF FILE MARKER (6-7-8-9 PUNCH)
```

APPENDIX D

SAMPLE OUTPUT

Appendix D contains the computer printout produced when using the sample input in Appendix C. Page D-2 is a table of the ships in the model and their characteristics. Page D-3 is a table of the frames in the model and their characteristics. Page D-4 is a table listing the status of each ship in the game on day 1, quarter 1. Page D-5 is a table listing the status of each frame in the game on day 1, quarter 1. Pages D-4 and D-5 can be listed for every day as explained earlier. Page D-6 is a final summary page which can also be produced for each quarter.

SHIPS HOMEPORTED NEW LONDON TEST

SHIP NO.	NAME	SEQ. NO.	CLASS	NOR - OPS (DAYS) MEAN	NOR - OPS (DAYS) S.D.	EXT - OPS (DAYS) MEAN	EXT - OPS (DAYS) S.D.	IN OVRHL (DAYS) MEAN	IN OVRHL (DAYS) S.D.	BETWEEN OVRHL (DAYS) MEAN	BETWEEN OVRHL (DAYS) S.D.	AT TDR (DA/QTR)	A.C. NEED	STM NEED	FR NEED	NEST MAX	A.C. FURN	STM FURN	FR
1.	ASR	1.	0.0	*9970.	0.	0.	0.	90.	15.	1110.	30.	0.	1.00	29.	3.	3.	0.00	0.	46.
2.	SSN	1.	0.0	360.	30.	150.	15.	150.	15.	900.	30.	21.	7.00	0.	4.	1.	0.00	0.	39.
3.	SSN	2.	0.0	360.	30.	150.	15.	150.	15.	900.	30.	21.	7.00	0.	4.	1.	0.00	0.	39.
4.	SSN	3.	0.0	360.	30.	150.	15.	150.	15.	900.	30.	21.	7.00	0.	4.	1.	0.00	0.	39.
5.	SSN	4.	0.0	360.	30.	150.	15.	150.	15.	900.	30.	21.	7.00	0.	4.	1.	0.00	0.	39.
6.	SSN	5.	0.0	360.	30.	150.	15.	150.	15.	900.	30.	21.	7.00	0.	4.	1.	0.00	0.	39.
7.	SSN	6.	0.0	360.	30.	150.	15.	150.	15.	900.	30.	21.	7.00	0.	4.	1.	0.00	0.	39.
8.	SSN	7.	0.0	360.	30.	150.	15.	150.	15.	900.	30.	21.	7.00	0.	4.	1.	0.00	0.	39.

INADEQUATE UTILITIES FOR SHIP 1

FRAMES AND PIERS NEW LONDON TEST START DAY 0 QUARTER 0

FRAME NO.	STATUS OCC.=2 NOT=1	STEAM AVAIL	A.C. AVAIL	NEST AVAIL	1ST PR.	2ND PR	3RD PR.	4TH PR.	5TH PR.	LAF BEG=1 END=2	STEAM IN USE	A.C. IN USE	SHIP NO.	SHIP NAME	SHIP SEQ NO.	NEST USED	PIER NO.
1	1.	0.	54.	2.	39.	99.	99.	99.	99.	1.	0.	0.	0.		0.	0.	1.
2	1.	0.	54.	2.	39.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
3	1.	0.	54.	2.	39.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
4	1.	0.	54.	2.	39.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
5	1.	0.	54.	2.	39.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
6	1.	0.	54.	2.	39.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
7	1.	0.	54.	2.	39.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
8	1.	0.	54.	2.	39.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
9	1.	0.	54.	0.	46.	99.	99.	99.	99.	1.	0.	0.	0.		0.	0.	1.
10	1.	0.	54.	0.	46.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
11	1.	0.	54.	0.	46.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
12	1.	0.	54.	0.	99.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
13	1.	0.	54.	0.	99.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
14	1.	0.	54.	0.	99.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
15	1.	0.	54.	0.	99.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
16	1.	0.	54.	0.	99.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
17	1.	0.	0.	1.	39.	99.	99.	99.	99.	2.	0.	0.	0.		0.	0.	1.
18	1.	0.	0.	1.	39.	99.	99.	99.	99.	1.	0.	0.	0.		0.	0.	2.
19	1.	0.	0.	1.	39.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	2.
20	1.	0.	0.	1.	39.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	2.
21	1.	0.	0.	1.	39.	99.	99.	99.	99.	2.	0.	0.	0.		0.	0.	2.
22	1.	0.	0.	1.	39.	99.	99.	99.	99.	1.	0.	0.	0.		0.	0.	2.
23	1.	0.	0.	1.	39.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	2.
24	1.	0.	0.	1.	39.	99.	99.	99.	99.	2.	0.	0.	0.		0.	0.	2.

LEAVING THE ASSIGNMENT STAGE

HOMEPORTED SHIPS NEW LONDON TEST START DAY 1 QUARTER 1

SHIP NO.	NAME	SEQ. NO.	CLASS (1./2.3 =TNDR)	IN	CUT	DAYS TO GO	PIER	---- PIERSIDE --- C.I.	NO C.I.	PART UTIL	NC UTIL	-- NESTED ---- C.I.	PART UTIL	NC UTIL	---- TENDER -- C.I.	PART UTIL	NC UTIL	HIGH FRAME	STREAM	OVRH	SHIP CYCLE NCR CPS CUT	EXT OPS
1.	ASR	1.	0.0	X		2					X							11				
2.	SSN	1.	0.0	X		17	P1	X										4				
3.	SSN	2.	0.0	X		4						X						4				
4.	SSN	3.	0.0		X	1															X	
5.	SSN	4.	0.0	X		8	P2	X										8				
6.	SSN	5.	0.0		X	72																X
7.	SSN	6.	0.0		X	68																X
8.	SSN	7.	0.0	X		2						X						4				

FRAMES AND PIERS NEW LONDON TEST START DAY 1 QUARTER 1

FRAME NO.	STATUS OCC.=2 NOT=1	STEAM AVAIL	A.C. AVAIL	NEST AVAIL	1ST PR.	2ND PR	3RD PR.	4TH PR.	5TH PR.	LAP REG=1 END=2	STEAM IN USE	A.C. IN USE	SHIP NO.	SHIP NAME	SHIP SEQ NO.	NEST USED	PIER NO.
1	2.	0.	54.	2.	39.	99.	99.	99.	99.	1.	0.	21.	2.	SSN	1.	2.	1.
2	2.	0.	54.	2.	39.	99.	99.	99.	99.	0.	0.	21.	2.	SSN	1.	2.	1.
3	2.	0.	54.	2.	39.	99.	99.	99.	99.	0.	0.	21.	2.	SSN	1.	2.	1.
4	2.	0.	54.	2.	39.	99.	99.	99.	99.	0.	0.	21.	2.	SSN	1.	2.	1.
5	2.	0.	54.	2.	39.	99.	99.	99.	99.	0.	0.	7.	5.	SSN	4.	0.	1.
6	2.	0.	54.	2.	39.	99.	99.	99.	99.	0.	0.	7.	5.	SSN	4.	0.	1.
7	2.	0.	54.	2.	39.	99.	99.	99.	99.	0.	0.	7.	5.	SSN	4.	0.	1.
8	2.	0.	54.	2.	39.	99.	99.	99.	99.	2.	0.	7.	5.	SSN	4.	0.	1.
9	2.	0.	54.	0.	46.	99.	99.	99.	99.	1.	0.	0.	1.	ASR	1.	0.	1.
10	2.	0.	54.	0.	46.	99.	99.	99.	99.	0.	0.	0.	1.	ASR	1.	0.	1.
11	2.	0.	54.	0.	46.	99.	99.	99.	99.	0.	0.	0.	1.	ASR	1.	0.	1.
12	1.	0.	54.	0.	99.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
13	1.	0.	54.	0.	99.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
14	1.	0.	54.	0.	99.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
15	1.	0.	54.	0.	99.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	1.
16	1.	0.	54.	0.	99.	99.	99.	99.	99.	2.	0.	0.	0.		0.	0.	1.
17	1.	0.	0.	1.	39.	99.	99.	99.	99.	1.	0.	0.	0.		0.	0.	2.
18	1.	0.	0.	1.	39.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	2.
19	1.	0.	0.	1.	39.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	2.
20	1.	0.	0.	1.	39.	99.	99.	99.	99.	2.	0.	0.	0.		0.	0.	2.
21	1.	0.	0.	1.	39.	99.	99.	99.	99.	1.	0.	0.	0.		0.	0.	2.
22	1.	0.	0.	1.	39.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	2.
23	1.	0.	0.	1.	39.	99.	99.	99.	99.	0.	0.	0.	0.		0.	0.	2.
24	1.	0.	0.	1.	39.	99.	99.	99.	99.	2.	0.	0.	0.		0.	0.	2.

PORT CONTROL LOG FOR DAY 1 QUARTER 1 NEW LONDON TEST

STATE	NUMBER OF SHIPS
NORMAL OPS IN	5
IN COLD IRON	2
NORMAL OPS OUT	1
IN OVERHAUL	0
EXTENDED OPS	2

SHIP NAME SSN SEQ.NO. 3. CLASS = 0. IS NESTED IN FRAME = 8 FOR 10 DAYS
HAS UTILITIES

NEW LONDON TEST FINAL SUMMARY BY QUARTERS FOR ALL QUARTERS (CUMULATIVE)

NAME	SEQ NO.	CLASS	AT PIER WITH UTILITIES – PIERSIDE – NOR-OPS	C.I. STNDN	C.I. POM	PART UTIL	AT TENDER	AT PIER WITHOUT UTILITIES – NOR-OPS	PRE STNDN	PRE POM	IN STREAM NOR-OPS	IN STREAM PRE STNDN	IN STREAM PRE POM	NOR-CPS CUT	IN OVER-HAUL	ON EXT-OPS
ASR	1.	0.	0	0	0	64	0	1	0	0	0	0	0	26	0	0
SSN	1.	0.	51	16	0	0	0	0	0	0	0	0	0	24	0	0
SSN	2.	0.	57	0	0	0	0	0	0	0	0	0	0	34	0	0
SSN	3.	0.	59	0	0	0	0	0	0	0	0	0	0	32	0	0
SSN	4.	0.	0	0	7	0	0	0	0	0	0	0	0	0	0	84
SSN	5.	0.	0	20	0	0	0	0	0	0	0	0	0	0	0	71
SSN	6.	0.	0	24	0	0	0	0	0	0	0	0	0	0	0	67
SSN	7.	0.	58	0	0	0	0	0	0	0	0	0	0	33	0	0
TOTALS			225	60	7	64	0	1	0	0	0	0	0	149	0	222
PERCENTAGE			30.9	8.2	1.0	8.8	0.0	.1	0.0	0.0	0.0	0.0	0.0	20.5	0.0	30.5

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